



# **Interactive Highway Safety Design Model (IHSDM)**

## **IHSDM User's Manual**

*Developed for*  
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## 1. Introduction

The IHSDM User's Manual is one component of the documentation supporting the Interactive Highway Safety Design Model (IHSDM). This introductory section: (1) provides a brief overview of IHSDM, (2) describes the basic structure of the IHSDM software package, and (3) states the purpose of this particular manual.

### 1.1 Overview of IHSDM

IHSDM is a suite of software analysis tools for evaluating safety and operational effects of geometric design in the highway project development process. The scope of the current release of IHSDM is two-lane rural highways.

IHSDM is intended as a supplementary tool to augment the design process. This tool is designed and intended to predict the functionality of proposed or existing designs by applying chosen design guidelines and generalized data to predict performance of the design. This tool is NOT a substitute for engineering judgment and does not create a standard, guideline or prescriptive requirement that can be argued to create any standard of care upon a designer, highway agency or other governmental body or employee. The use of this tool for any purpose other than to aid a qualified design engineer in the review of a set of plans is beyond the designed scope of this tool and is not endorsed by the Federal Highway Administration (FHWA).

The suite of IHSDM tools includes the following evaluation modules. Each module of IHSDM evaluates an existing or proposed geometric design from a different perspective and estimates measures describing one aspect of the expected safety and operational performance of the design.

- Policy Review Module (PRM) - The Policy Review Module checks a design relative to the range of values for critical dimensions recommended in AASHTO design policy.
- Crash Prediction Module (CPM) - The Crash Prediction Module provides estimates of expected crash frequency and severity.
- Design Consistency Module (DCM) - The Design Consistency Module estimates expected operating speeds and measures of operating-speed consistency.
- Intersection Review Module (IRM) - The Intersection Review Module leads users through a systematic review of intersection design elements relative to their likely safety and operational performance.
- Traffic Analysis Module (TAM) - The Traffic Analysis Module estimates measures of traffic operations used in highway capacity and quality of service evaluations.

Intended users of IHSDM results are geometric design decision makers in the highway design process, including project managers, planners, designers, and reviewers. The Federal Highway Administration's Flexibility in Highway Design document (Publication No. FHWA-PD-97-062) explains the context within which these decision makers operate:

An important concept in highway design is that every project is unique. The setting and character of the area, the values of the community, the needs of the highway users, and the challenges and opportunities are unique factors that designers must consider in each highway project. Whether the design to be developed is for a modest safety improvement or 10 miles of new-location rural freeway, there are no patented solutions. For each potential project, designers are faced with the task of balancing the need for the improvement with the need to safely integrate the design into the surrounding natural and human environment.

The measures of expected safety and operational performance estimated by IHSDM are intended as inputs to the decision making process. The value added by IHSDM is in providing quantitative estimates of effects that previously could be considered only in more general, qualitative terms. The advantage of these quantitative estimates is that, when used appropriately by knowledgeable decision makers, they permit more informed decision-making.

The following general cautions should be considered in using IHSDM:

- Measures of expected safety and operational performance from IHSDM are only a subset of the large number of inputs that must be considered in making design decisions.
- Estimates from IHSDM are expected values, in the statistical sense, i.e., they represent the estimated average performance over a long time period and among a large number of sites with similar characteristics. Actual performance may vary over time and among sites. The estimates from IHSDM should not substitute for, but rather should supplement and complement local knowledge.
- While derived from the best available data using the best available methods, both the available data and methods have limitations. The engineer's manuals for each module document limitations that should be understood to apply appropriately the resulting estimates.

## **1.2 Basic Structure of IHSDM Software Package**

This section orients the user to the basic structure of the IHSDM software package. IHSDM is currently a stand-alone safety analysis software tool. In the future, it will be possible to integrate IHSDM with computer-aided design (CAD) packages. The development of IHSDM is a long-term, multi-year activity. The initial development efforts are restricted to two-lane rural highways, the largest single design class of highways in the United States. A subsequent phase of IHSDM will add the capability to evaluate multi-lane design alternatives.

The foundation block of IHSDM software is called Master Control Module which provides data and communication services to the engineering modules in the package. The services include data import and export; interactions with CAD/civil design software, word processors and web browsers. The current Public 2003 Release baseline version of the safety modules are listed in the following table.

**Table 1. Current Candidate Beta/Developer Module Versions**

Module	Acronym	Version	Date
Basic Services		2.05b	Mar 07, 2003
Policy Review Module	PRM	2.03c	Jan 08, 2003
Design Consistency Module	DCM	2.01d	Nov 15, 2002
Crash Prediction Module	CPM	1.00e	Dec 13, 2002
Intersection Review Module	IRM	1.00a	Mar 07, 2003
Traffic Analysis Module	TAM	1.00a	Mar 07, 2003

Two distinct operational implementations of IHSDM will be developed; the pre-CAD and CAD versions. The initial implementation of IHSDM will operate outside of a commercial civil design CAD package. This pre-CAD version will provide the basic computational elements supporting the IHSDM modules as well as a simple graphical user interface (GUI) and data management capability. A later implementation of IHSDM will be a seamless integration of the IHSDM functionality within various commercial civil design CAD packages. This CAD version will be developed by civil design package vendors using the computational elements developed as part of the pre-CAD version. The GUI and data management functionality of the CAD version will optionally use package specific capabilities.

### 1.3 Purpose

The IHSDM User's Manual introduces users to the capabilities and features of IHSDM. It explains in detail the mechanics of using the software and accessing all of its functionality. It is the primary source of information about operating the IHSDM graphical user interface.

This manual assumes IHSDM has been installed and configured; for assistance with these tasks, users should refer to the Getting Started Guide and Installation Manual.

Through this manual, users can access other documentation. For additional details on importing data from other sources, users may consult the Editing Highway Elements Manual and the GEOPAK-TO-IHSDM Application Programmer's Interface (API) User's Manual. A IHSDM Troubleshooting Guide provides guidance on solving typical problems. Engineer's manuals for each safety module provide engineering insight regarding data input requirements, evaluation options, and module outputs.

The major sections of this document describe the Master Control Module, A Typical Session, IHSDM User Properties, and IHSDM Documentation.

## 2. Master Control Module

The IHSDM program provides a point-and-click, windows-based graphical user interface (GUI) to create and edit projects, define an analysis, import highway data, enter and edit highway data, and view the results of such processing. The following subsections will specify how to start an IHSDM session and describe IHSDM's GUI elements.

### 2.1 Launching IHSDM

IHSDM can be launched by any of the following methods:

From the **Start** menu, select **Programs|IHSDM|Run IHSDM** and the IHSDM program is launched.

1. On the desktop, double-click on the **ihsdm.exe** icon and the IHSDM program is launched.
2. In **Windows Explorer**, double-click on the **ihsdm.exe** file and the IHSDM program is launched.
3. From the **Start** menu, select **Run**, and then type **{IHSDM\_HOME}\ihsdm.exe** (where **{IHSDM\_HOME}** is the directory where the **ihsdm.exe** file is located). Click the **OK** button and the IHSDM program is launched.

## 2.2 Using the Graphical User Interface

This section provides a high-level introduction to using the various features of the IHSDM graphical user interface (GUI).

Each IHSDM application has a primary window-based interface referred to as the application window. All applications use a set of dialog windows to solicit control options and communicate results with the user. An optional status window provides a log of the application session status. A number of options are supported to tailor the look and feel of the GUI to the user's personal preferences.

The application window and all dialog windows are composed of a set of widgets (e.g., buttons or text boxes) and/or menus. The widgets and menus are used to specify data and control the operations of the application.

### 2.2.1 Windows

The following sections discuss features found in application windows, dialog windows, and the status window.

#### 2.2.1.1 Application Windows

The **primary** application window controls the IHSDM session. It is displayed throughout the entire session. The application window contains an application menu and various widgets. To launch an application refer to **Launching IHSDM** for details. The list of main applications and their primary window includes:

- **IHSDM** - Launched via **ihsdm.exe**, the Master Control Module window is the primary application window.
- **Configure** - Launched via **configure.exe**, the Configuration Utility window is the primary application window.
- **Administration** - Launched via **admin.exe**, the System Administration Utility window is the primary application window.

**Note:** Two primary applications from the same distribution cannot be executed at the same time. Examples of **secondary** application windows include the Edit/View Highway Element window, the Highway Viewer window and the Data Graph window.

#### 2.2.1.2 Dialog Windows

Dialog windows contain widgets used to manipulate a specific set of information. They generally do not contain menus. Dialog windows must be closed before the executing application can proceed.

Dialog windows are usually launched via widgets found in other dialog windows or via menu items found in the application window.



### 2.2.1.3 Status Window

The status window is attached to the executing application window. It displays a log of the application session's status. Displaying the status window is optional and can be modified by changing the user properties, refer to Properties, Display tab.

### 2.2.1.4 GUI Properties

A number of the properties of the application, dialog and status windows may be specified by the user. These properties include the color, font and use of icons/tooltips. The window properties are specified as part of the general user properties dialog. This dialog is accessed from the Edit|Edit User Properties application menu item or the Edit IHSDM User Properties toolbar button. The various window properties options are contained under the Properties, Display tab.

**Note: Most changes to the window properties will not take effect until the next time an IHSDM application is invoked.**

## 2.2.2 Widgets

Two general categories of widgets are available in the IHSDM: data entry widgets that solicit input values, and action widgets that invoke actions. Data entry widgets include Text Field Widgets, Text Area Widgets, Text with Button Widgets, Check Box Widgets, Combo Box Widgets, Text Slider Widgets, List Box Widgets, Station List Box Widgets, text selector, file chooser, and color selector. Action widgets include Toolbar Button Widgets, link area, Simple Button Widgets, Radio Button Widgets, and Popup Button Widgets.

### 2.2.2.1 Text Field Widgets

The IHSDM system uses the Java **JTextField** object to implement text field widgets.

Text field widgets are used when the value of the associated data item is entered by the user. Text field widgets are composed of a label followed by a one line data entry area.

Refer to Section 2.2.2.17, *Widget Help* for information on what help is available for the widget.

#### 2.2.2.1.1 Editing

As the pointer is moved over the text field, the cursor will change to an **I** bar. The editing of the text field is initialized with a single click of **button 1** (e.g., left button).

#### Cursor Movement

- **Left** - The **Left-Arrow** key moves the text cursor to the left.
- **Right** - The **Right-Arrow** key moves the text cursor to the right.
- **Beginning** - The **Home** key moves the text cursor to the beginning of the text field.
- **End** - The **End** key moves the text cursor to the end of the text field contents.

#### Cut and Paste

- **Selection** - The **Ctrl-A** key selects the entire contents of the widget.
- **Copy** - The **Ctrl-C** key copies the current selection of the widget to the system clipboard buffer.
- **Cut** - The **Ctrl-X** key cuts (copies and deletes) the current selection of the widget to the system clipboard buffer.

- **Paste** - The **Ctrl-V** key copies the content of the system clipboard buffer to the widget.

#### Clearing

- **Delete** - The **Delete** key removes the current selection or one character to the right of the cursor.
- **Backspace** - The **Backspace** key removes the current selection or one character to the left of the cursor.
- **Cut** - The **Ctrl-X** key cuts (copies and deletes) the current selection of the widget to the system clipboard buffer.

#### 2.2.2.2 Text Area Widgets

Text area widgets are used when a large string needs to be entered by the user. Text area widgets are composed of a label followed by a data entry area.

Refer to Section 2.2.2.17, *Widget Help* for information on what help is available for the widget.

##### 2.2.2.2.1 Editing

As the pointer is moved over the text field, the cursor will change to an **I** bar. The editing of the text field is initiated with a single click of **button 1** (e.g., left button).

#### Cursor Movement

- **Left** - The **Left-Arrow** key moves the text cursor to the left.
- **Right** - The **Right-Arrow** key moves the text cursor to the right.
- **Up** - The **Up-Arrow** key moves the text cursor to the up.
- **Down** - The **Down-Arrow** key moves the text cursor to the down.
- **Beginning** - The **Home** key moves the text cursor to the beginning of the text field.
- **End** - The **End** key moves the text cursor to the end of the text field contents.

#### Cut and Paste

- **Selection** - The **Ctrl-A** key selects the entire contents of the widget.
- **Copy** - The **Ctrl-C** key copies the current selection of the widget to the system clipboard buffer.
- **Cut** - The **Ctrl-X** key cuts (copies and deletes) the current selection of the widget to the system clipboard buffer.
- **Paste** - The **Ctrl-V** key copies the content of the system clipboard buffer to the widget.

#### Clearing

- **Delete** - The **Delete** key removes the current selection or one character to the right of the cursor.
- **Backspace** - The **Backspace** key removes the current selection or one character to the left of the cursor.
- **Cut** - The **Ctrl-X** key cuts (copies and deletes) the current selection of the widget to the system clipboard buffer.

### 2.2.2.3 Text with Button Widgets

Text with button widgets are a combination of a text field and a simple button. Usually, the text field is used to attach a name to set of associated data.

Refer to Section 2.2.2.17, *Widget Help* for information on what help is available for the widget.

#### 2.2.2.3.1 Activating

The simple button is used to invoke a dialog window containing additional widgets for editing the data.

### 2.2.2.4 Check Box Widgets

The IHSDM system uses the Java **JCheckBox** object to implement check box widgets.

Check box widgets are used to specify a binary value for the associated data: true/false, on/off, yes/no, etc.

Refer to Section 2.2.2.17, *Widget Help* for information on what help is available for the widget.

#### 2.2.2.4.1 Selecting

The value of the check box widget is toggled with a single click of **button 1** (e.g., left button).

### 2.2.2.5 Combo Box Widgets

The IHSDM system uses the Java **JComboBox** object to implement combo box widgets.

Combo box widgets are used when the associated data item can assume a discrete set of enumeration values.

Refer to Section 2.2.2.17, *Widget Help* for information on what help is available for the widget.

#### 2.2.2.5.1 Selecting

A single click of **button 1** (e.g., left button) displays the enumeration items, in a drop down list, that may be selected as the value of the data item.

Note: that a vertical scroll bar will be displayed if the number of enumeration items is large. Moving the pointer through the items highlights an item. Once highlighted, the item may be selected with another click of **button 1** (e.g., left button).

### 2.2.2.6 Text Slider Widgets

The IHSDM system uses the Java **JSlider** object to implement text slider widgets.

Text slider widgets are used to determine a numeric value within a fixed range.

Refer to Section 2.2.2.17, *Widget Help* for information on what help is available for the widget.

#### 2.2.2.6.1 Editing

The user can select the desired numeric value by moving the slider arrow over the desired value. To move the slider arrow hold down **button 1** (e.g., left button) and move the mouse left or right until the arrow rests over the desired value on the scale, then release the mouse button. A text field is also provided as another means of inputting the desired value.

### 2.2.2.7 List Box Widgets

List box widget are used to display and edit tabular elements.

### 2.2.2.7.1 List Box Properties

The functionality and operation of all list boxes is controlled by a user property. The check box, **Use List Box Edit Dialog**, found in the user properties, on the Display tab's, List Box Attributes Tab, can be toggled on and off to control the operations available for a list box. The yes value of the property enables dialogs for list box edits, and the no value of the property disables dialogs for list box edits. When dialogs are enabled the list box has an extra control button labeled **Edit**. Most users will find the dialog enabled list box widget more functional. For details on how the dialog windows operate, refer to dialog window.

Refer to Section 2.2.2.17, *Widget Help* for information on what help is available for the widget.

### 2.2.2.7.2 Editing

The buttons on the right of the list box are used to control the contents of the list box. Various Any combination of the following buttons will be displayed. The combination is determined by the list box and the user property, Use List Box Edit Dialog. If the Use List Box Edit Dialog user property is enabled, generally, a button action displays a dialog containing entry items. If the Use List Box Edit Dialog user property is enabled, a button action displays a dialog containing entry items. Otherwise the user is required to modify each item directly in the list, refer to each item's widget to determine how it should be edited.

- **Add** - The **Add** button creates a new entry in the listbox. Either a dialog to allow the user to enter the items associated with the new entry will be displayed, or a new row in the list box will appear.
- **Clone** - The **Clone** button creates a new entry in the listbox from another, selected, entry (row) of the list box. Either a dialog to allow the user to modify the items associated with the new entry will be displayed, or a new row in the list box containing the data from the selected entry, will appear.
- **Delete** - The **Delete** button deletes the selected entry (row) from the list box. A dialog will be displayed to request confirmation of the delete operation.
- **Edit** - The **Edit** button edits a selected row in the list box. This button displays a dialog to allow the user to modify the items associated with the selected entry.
- **Select** - The **Select** button selects the highlighted row in the list box and closes the dialog.
- **Cancel** - The **Cancel** button closes the dialog without specifying the selection of any entry.

### 2.2.2.7.3 Sorting

The list can be sorting in ascending or descending order by item. Click on the item column label with **button 1** (e.g., left button) to order the list. Clicking on the item column label again with **button 1** (e.g., left button) toggles between ascending and descending order (shown by an arrow).

### 2.2.2.8 Station List Box Widgets

Station List box widgets are used to display and edit tabular station sorted elements. They are a special case of a list box widget.

### 2.2.2.9 Text Selector Widgets

The text selector functions similar to a list box widget.

### 2.2.2.10 File Chooser Widgets

The file chooser functions similar to a list box widget.

### 2.2.2.11 Color Selector Widgets

The color selector widgets are standard Java dialogs. Refer to Using the Color Chooser (<http://www.java.sun.com/docs/books/tutorial/uiswing/components/colorchooser>

### 2.2.2.12 Toolbar Button Widgets

The IHSDM system uses the Java **JButton** object to represent toolbar button widgets.

Refer to Section 2.2.2.17, *Widget Help* for information on what help is available for the widget.

#### 2.2.2.12.1 Activation

As the pointer is moved over the toolbar button, the cursor will change to a pointing finger. The action associated with the button is initiated by a single click of **button 1** (e.g., left button).

### 2.2.2.13 Link Area Widgets

The link area widget is a list of string hyperlinks.

Refer to Section 2.2.2.17, *Widget Help* for information on what help is available for the widget.

#### 2.2.2.13.1 Activation

As the pointer is moved over the text in the area, the cursor will change to a pointing finger. The action associated with the link area text is initiated by a double click of **button 1** (e.g., left button).

Refer to Section 2.2.2.17, *Widget Help* for information on what help is available for the widget.

### 2.2.2.14 Simple Button Widgets

The IHSDM system uses the Java **JButton** object to represent simple button widgets.

Refer to Section 2.2.2.17, *Widget Help* for information on what help is available for the widget.

#### 2.2.2.14.1 Activation

As the pointer is moved over the simple button, the cursor will change to a pointing finger. The action associated with the button is initiated by a single click of **button 1** (e.g., left button).

### 2.2.2.15 Radio Button Widgets

Radio button widgets are used to select an option from a group of options.

Refer to Section 2.2.2.17, *Widget Help* for information on what help is available for the widget.

#### 2.2.2.15.1 Activation

The option associated with a radio button is activated with a single click of **button 1** (e.g., left button). At least one option in a radio button group must be selected.

### 2.2.2.16 Popup Button Widgets

Popup buttons are used to invoke a popup menu.

Refer to Section 2.2.2.17, *Widget Help* for information on what help is available for the widget.

### 2.2.2.16.1 Activitation

As the pointer is moved over the popup button, the cursor changes to a pointing finger. A single click of **button 1** (e.g., left button) on the button invokes a popup menu, displaying it's menu items. Select a menu item by a single click of **button 1** (e.g., left button) on the desired menu item.

### 2.2.2.17 Widget Help

As the pointer rests over a widget in the window, a tooltip will appear if one is available. To enable help associated with a widget, refer to the Properties, Display tab.

A popup menu associated with the widget will be displayed with a single click of **button 3** (e.g., right button). Any of these help menu items may be enabled:

- **Item Help** - If enabled, this menu item displays a brief help message in a help dialog box.
- **Reference Manual** - If enabled, this help item displays context specific information from the appropriate IHSDM reference manual using the user's specified HTML browser.
- **Advanced Help** - If enabled, this help item displays more detailed help information using the user's specified HTML browser.

## 2.2.3 Menus

Two categories of menus are available in the IHSDM, the application menu, and popup menu. The application menu only resides on the menu bar of the application window. A popup menu can occur on any application window or dialog window.

### 2.2.3.1 Application Menus

The IHSDM system uses the Java **JMenu** object to represent the Application Menu.

#### 2.2.3.1.1 Activitation

As the pointer is moved over the menu, a single click of **button 1** (e.g., left button) expands the menu, displaying it's menu items. Select a menu item by a single click of **button 1** (e.g., left button) on the desired menu item.

### 2.2.3.2 Popup Menus

The IHSDM system uses the Java **JPopupMenu** object to represent the Popup Menu.

#### 2.2.3.2.1 Activitation

A single click of **button 3** (e.g., right button) invokes a popup menu, displaying it's menu items. Select a menu item by a single click of **button 1** (e.g., left button) on the desired menu item.

### 2.2.3.3 Highway Viewer

The IHSDM system uses the Java **JPanel** object to implement highway view widgets widgets.

Highway view widgets are used to show the associated highway(s) from a specific view (plan, profile, cross-section).

#### 2.2.3.3.1 Using

The user can translate the highway within the view by holding down the left mouse button and dragging. The user can zoom in on the highway by holding down the right mouse button and dragging. A quick right mouse click on the view will open a popup menu that allows the user access to several more viewing options.

## 2.3 Master Control Module Graphical User Interface

This dialog is the primary graphical user interface for the Public Test release of the Master Control Module. Access to all Public test modules is available from this dialog. The **Interactive Highway Safety Design Model** frame includes the following menu items: File, Edit, View and Help. The **Interactive Highway Safety Design Model** frame includes the following toolbar buttons: Start Project/Analysis/Highway Wizard, Create New Project, Open Existing Project, Create New Analysis, Open Existing Analysis, Edit Highway Data, Edit Highway Intersection Data, View Highway Data, Edit User Properties, Edit User Defaults, View Current Analysis Report, View Analysis Report Index, Display User's Manual, Search Master Index and Exit. The **Interactive Highway Safety Design Model** frame includes the following tabs: Project/Analysis, Policy Review, Crash Prediction, Design Consistency, Intersection Review and Traffic Analysis. The **Interactive Highway Safety Design Model** frame includes the following statusbar fields: Progress Bar and Progress Bar Text.

### 2.3.1 Menu Items

The Interactive Highway Safety Design Model Frame includes the following menu items:

- **File** - The **File** menu includes the following menu items: Project/Analysis/Highway Wizard, Open a Previous Analysis, Project, Analysis, Import Highway Data and Exit IHSDM.
  - **Project/Analysis/Highway Wizard** - This menu item starts the project/analysis/highway wizard dialog to define and select a new project, analysis and master highway.
  - **Open a Previous Analysis** - This menu displays previous analyses as menu items. The **Open a Previous Analysis** menu includes the following menu items: (none).
    - **(none)** - No previous project/analysis/master highway is available.
  - **Project** - This menu includes menu items to create a new project, open an existing project or close a project. The **Project** menu includes the following menu items: New Project, Open Project, Close Project and Manage Projects.
    - **New Project** - This menu item displays the dialog to create a new project.
    - **Open Project** - This menu item displays the dialog to open (select) an existing project.
    - **Close Project** - This menu item closes the current project.
    - **Manage Projects** - This menu item will launch the project list manager. The current project must be closed to preform this operation. Project list management operations include renaming, moving and deleting projects.
  - **Analysis** - This menu includes menu items to create a new analysis, open an existing analysis or close an analysis. The **Analysis** menu includes the following menu items: New Analysis, Open Analysis, Clone Analysis, Close Analysis and Manage Analyses.
    - **New Analysis** - This menu item displays the dialog to create a new analysis.
    - **Open Analysis** - This menu item displays the dialog to open (select) an existing analysis.

- **Clone Analysis** - This menu item displays the dialog to clone (copy) the current analysis with a new name. Only the current analysis attributes are cloned, no reports or other program outputs are cloned.
  - **Close Analysis** - This menu item closes the current analysis.
  - **Manage Analyses** - This menu item will launch the analysis list manager. The current analysis must be closed to preform this operation. Analysis list management operations include renaming, moving and deleting projects.
- **Import Highway Data** - This menu item invokes the Data Import Utility to import a file such as a highway file. The **Import Highway Data** menu includes the following menu items: IHSDM Highway Data and TWOPAS Input Data.
  - **IHSDM Highway Data** - This menu item imports either IHSDM CSV or LandXML highway data files.
  - **TWOPAS Input Data** - This menu item imports TWOPAS input data.
- **Exit IHSDM** - This menu item saves the current analysis information, closes the IHSDM window and exits all IHSDM processes.
- **Edit** - This menu includes menu items to edit highway datasets, edit user properties and to complete an IHSDM program report. The **Edit** menu includes the following menu items: Edit/View Highway Data, Edit Intersections, Manage Highway Datasets, Edit User Properties, Edit Defaults and Problem Report/Change Request.
  - **Edit/View Highway Data** - This menu includes menu items to edit either the current or selected highway dataset. The **Edit/View Highway Data** menu includes the following menu items: Select Master Highway, Select from Available Highways, Create Highway Data and Clone Highway Data.
    - **Select Master Highway** - This menu item brings up a new window to edit the master highway associated with the current analysis.
    - **Select from Available Highways** - This menu item brings up a dialog to select a highway dataset by name and then launches the edit/view highway data editor with the selected highway.
    - **Create Highway Data** - This menu item brings up a dialog to create a new highway dataset name and then launches the edit/view highway data editor.
    - **Clone Highway Data** - This menu item brings up a dialog to select a highway dataset by name and creates a new name for the cloned highway dataset.
  - **Edit Intersections** - This menu item invokes the intersection data editor dialog to allow intersection data associated with this highway dataset to be edited. For additional information, see IHSDM Intersection Model.
  - **Manage Highway Datasets** - This menu item launches the highway dataset list manager. The current analysis must be closed to preform this operation. Highway dataset list management operations include renaming and deleting highway datasets.
  - **Edit User Properties** - This menu item brings up a dialog to edit the IHSDM user properties.
  - **Edit Defaults** - This menu item brings up a dialog to edit the default values to the IHSDM modules.



- **Problem Report/Change Request** - This menu contains menu items to create a new PR/CR or edit an existing PR/CR. The **Problem Report/Change Request** menu includes the following menu items: Create New PR/CR, Edit Existing PR/CR and List Existing PR/CR .
  - o **Create New PR/CR** - This menu item brings up a dialog to complete a new IHSDM problem report/change request.
  - o **Edit Existing PR/CR** - This menu item brings up a file chooser dialog to select a file. If selected, the file will be read as an IHSDM problem report/change request and displayed.
  - o **List Existing PR/CR** - This menu item brings up browser with a listing of the current PR/CR issues at the development website.
- **View** - This menu includes menu items to display and clear the analysis log and analysis report. The **View** menu includes the following menu items: View Analysis Log, Start a New Analysis Report, View Current Analysis Report, View Analysis Report Index, Clear Analysis Log, Clear Analysis Report and Open Saved Graph.
  - **View Analysis Log** - This menu item launches the user's specified text editor with the current analysis log.
  - **Start a New Analysis Report** - This menu item causes a new analysis report file to be started.
  - **View Current Analysis Report** - This menu item launches the user's specified analysis report display tool with the current analysis report.
  - **View Analysis Report Index** - This menu item launches the user's specified HTML browser to display an index of analysis reports available within the current analysis.
  - **Clear Analysis Log** - This menu item clears (erases) the current analysis log.
  - **Clear Analysis Report** - This menu item clears (erases) the current analysis report.
  - **Open Saved Graph** - This menu item invokes a dialog to open and display a previously saved graph. The graph file may be created from a DCM, CPM, DVM or TAM analysis.
- **Help** - The **Help** menu includes the following menu items: IHSDM User's Manual, User Documentation Summary, Master Index, Search Master Index and About IHSDM.
  - **IHSDM User's Manual** - This menu item launches the HTML browser to display the IHSDM User's Manual.
  - **User Documentation Summary** - This menu item launches the HTML browser to display the **User Documentation Summary**. The summary contain links to all the user documentation.
  - **Master Index** - This menu item launches the HTML browser to display the **IHSDM Documentation Master Index**.
  - **Search Master Index** - This menu item launches a dialog to allow a keyword search of the **IHSDM Documentation Master Index**.
  - **About IHSDM** - This menu item displays the Master Control Module about box.

### 2.3.2 Toolbar

The Interactive Highway Safety Design Model Frame includes the toolbar buttons listed below.

**Start Project/Analysis/Highway Wizard** - This toolbar button starts the project/analysis/highway wizard dialog to define and select a new project, analysis and master highway.

**Create New Project** - This toolbar button starts the dialog to define and select a new project.

**Open Existing Project** - This toolbar button displays the dialog to open (select) an existing project.

**Create New Analysis** - This toolbar button displays the dialog to create a new analysis.

**Open Existing Analysis** - This toolbar button displays the dialog to open (select) an existing analysis.

**Edit Highway Data** - This toolbar button starts the Edit/View Highway Data editor for the master highway.

**Edit Highway Intersection Data** - This toolbar button starts the intersection editor for the master highway. For additional information, see IHSDM Intersection Model.

**View Highway Data** - This button launches the graphical highway viewer for the master highway.

**Edit User Properties** - This toolbar button brings up a dialog to edit the IHSDM user properties.

**Edit User Defaults** - This button brings up a dialog to edit the default values to the IHSDM modules.

**View Current Analysis Report** - This toolbar button item launches the user's specified analysis report display tool with the current analysis report.

**View Analysis Report Index** - This button launches the user's specified HTML browser to display an index of analysis reports available within the current analysis.

**Display User's Manual** - This toolbar button launches the HTML browser to display the IHSDM User's Manual.

**Search Master Index** - This toolbar button launches a dialog that support searching the master documentation index.

**Exit** - This toolbar button saves the data in the window and then exits the Master Control Module. The Interactive Highway Safety Design Model Frame includes the tabs described in the following sections.

### 2.3.3 Project/Analysis Tab

This tab contains the project/analysis identification, the current highway identification, and processing bounds.

**Figure 1 Project/Analysis Tab**

The **Project/Analysis** tab includes the following widgets: Project Name, Project Comment, Project Unit System, Analysis Name, Analysis Comment, Analysis E Max, Default Normal Cross Slope, Analysis Year, Highway Name, Chain, Comment, Edit/View Highway Data, Start Station, End Station and Design Vehicle.

- **Project Name** - Widget type: text field (read-only). The value of this item is the name of the project.
- **Project Comment** - Widget type: text field (read-only). This is an optional comment about the project.
- **Project Unit System** - Widget type: combo box (read-only). This item specifies the unit system used for the entry and display of all values associated with the project. This unit system is used to control all outputs as well as the unit system assumed for imported datasets if no unit system is explicitly specified in the imported file. The enumeration values are:
  - **user default** (user default unit system),
  - **Metric** (Metric unit system) and
  - **English** (English (Imperial) unit system).
- **Analysis Name** - Widget type: text field (read-only). This is the name of the analysis. The name of the analysis is unique within a project. If the user does not specify a name, the system will create one.
- **Analysis Comment** - Widget type: text field (read-only). This is an optional comment about the analysis.
- **Analysis E Max** - Widget type: combo box (read-only). Unit of measure: percent. The value of this item is the maximum superelevation, as a percentage, for this analysis. The enumeration values are: **4**, **6**, **8**, **10** and **12**. The unit of measure for this item is percent.

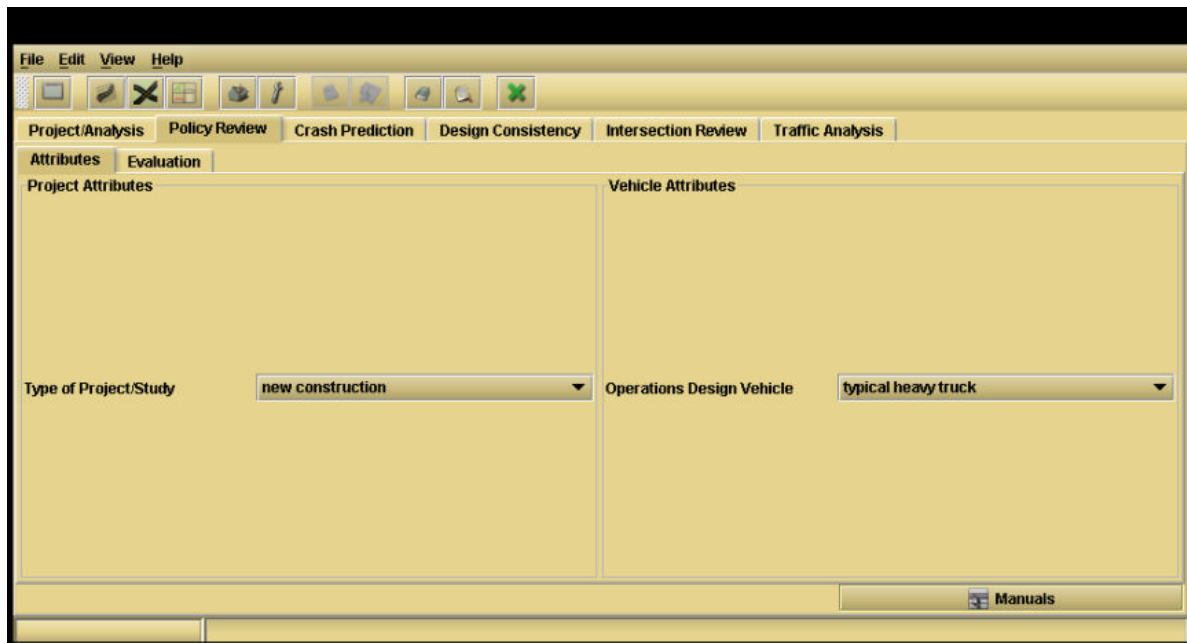
- **Default Normal Cross Slope** - Widget type: text field (read-only). Unit of measure: percent. The value of this item is the default normal cross slope, as a percentage, for this analysis. Once a highway dataset is imported, normal cross slope elements can be defined to vary the value along the alignment. The unit of measure for this item is percent.
- **Analysis Year** - Widget type: text field (read-only). Unit of measure: YEAR. The value of this item is the year of the analysis. It is used to compute the average daily traffic volume (ADT).
- **Highway Name** - Widget type: text field (read-only). The value of this item is the name of the master highway associated with the analysis.
- **Chain** - Widget type: text field (read-only). The value of this item is an optional chain name for the alignment associated with the highway dataset.
- **Comment** - Widget type: text field (read-only). The value of this item is an optional comment for the highway dataset.
- **Edit/View Highway Data** - Widget type: button. This button starts the edit/view highway data editor for the master highway.
- **Start Station** - Widget type: text field. Unit of measure: STATION. The value of this item is the effective starting station of this highway dataset for purposes of this analysis.
- **End Station** - Widget type: text field. Unit of measure: STATION. The value of this item is the effective end station of this highway dataset for purposes of this analysis.
- **Design Vehicle** - Widget type: combo box. This combo box determines the project's design vehicle. Elements are designed to accommodate the largest design vehicle likely to use a highway relatively frequently. Vehicles with special characteristics may also control design. The enumeration values are: **SU - Single Unit Truck, Bus - Single Unit Bus, A-Bus - Articulated Bus, WB-12(WB-40) - Intermediate semitrailer, WB-15(WB-50) - Large semitrailer, WB-18(WB-60) - Double Bottom semitrailer - full trailer, WB-19(WB-62) - Interstate semitrailer with 14.6m(48ft) trailer, WB-20(WB-67) - Interstate semitrailer with 16.2m(56ft) trailer, WB-29(WB-96) - Triple semitrailer, WB-35(WB-114) - Turnpike double semitrailer, MH - Motor Home, P/B - Car and Boat Trailer, MH/B - Motor Home and Boat Trailer, P - Passenger Car and P/T - Car and Camper Trailer.**

### 2.3.4 Policy Review Tab

This tab contains the primary graphic user interface to the Policy Review Module. The **Policy Review** tab includes the following sub-tabs: Attributes and Evaluation. The **Policy Review** tab includes the following widgets: Manuals. The Interactive Highway Safety Design Model Frame includes the tabs described in the following sections.

#### 2.3.4.1 Attributes Tab

The Attributes tab contains project and vehicle attribute information.



**Figure 2 Policy Review/Attributes Tab**

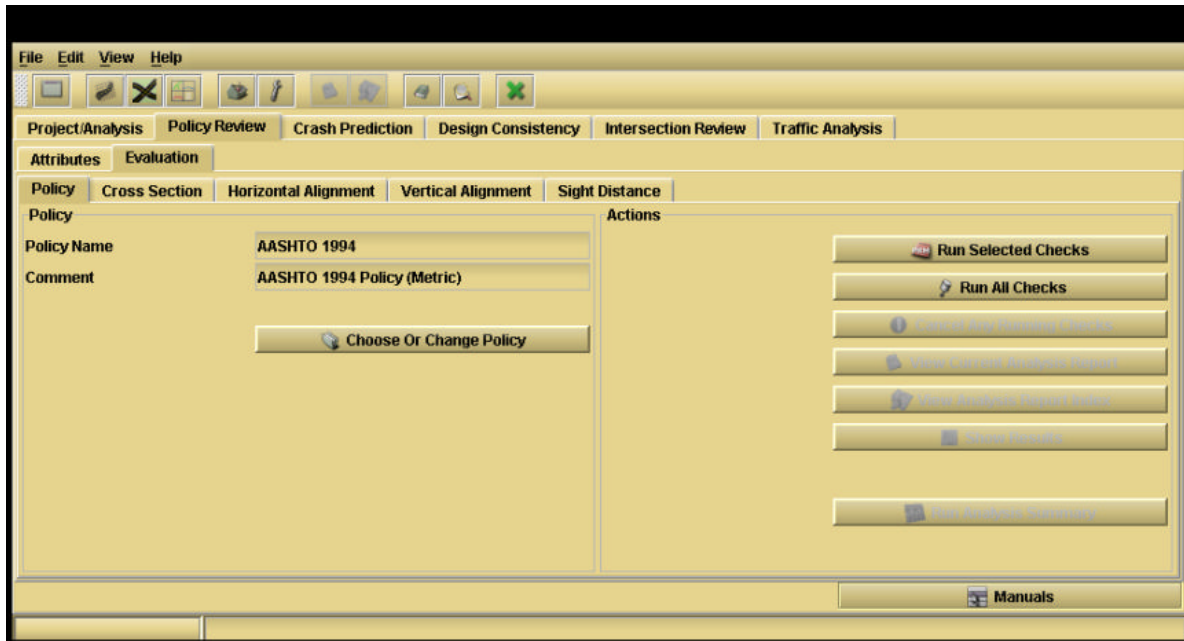
The **Attributes** tab includes the following widgets: Type of Project/Study and Operations Design Vehicle.

- **Type of Project/Study** - Widget type: combo box. The value of this item specifies the type of project or study. Policy guidance for certain design elements may vary depending on whether the project is new construction (i.e., a new alignment) or reconstruction (of an existing alignment). The value of this item is not needed for some policies, e.g. the AASHTO 2001 policies. The traveled way width, vertical curve and stopping sight distance policy check will use this value if required by the specified policy. The enumeration values are: **new construction** and **reconstruction**.
- **Operations Design Vehicle** - Widget type: combo box. This combo box determines the design vehicles for operations. The enumeration values are: **typical heavy truck** and **recreational vehicle**.

#### 2.3.4.2 Evaluation Tab

The **Evaluation** tab includes the following sub-tabs: Policy, Cross Section, Horizontal Alignment, Vertical Alignment and Sight Distance. The Interactive Highway Safety Design Model Frame includes the tabs described in the following sections.

##### 2.3.4.2.1 Policy Tab

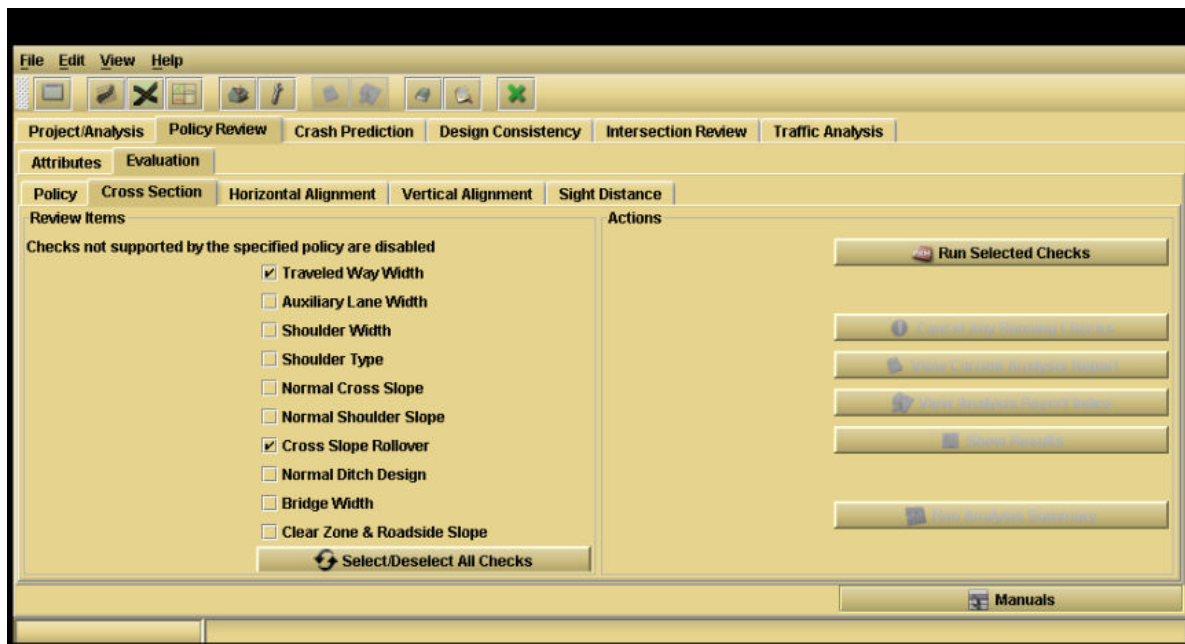


**Figure 3 Policy Review/Evaluation/Policy Tab**

The **Policy** tab includes the following widgets: Policy Name, Comment, Choose Or Change Policy, Run Selected Checks, Run All Checks, Cancel Any Running Checks, View Current Analysis Report, View Analysis Report Index, Show Results and Run Analysis Summary.

- **Policy Name** - Widget type: text field (read-only). The value of this item is the name of the policy. The policy name is unique within the system.
- **Comment** - Widget type: text field (read-only). The value of this item is an optional descriptive comment about the policy.
- **Choose Or Change Policy** - Widget type: button. This button displays a dialog that allows the user to select or modify the current policy.
- **Run Selected Checks** - Widget type: button. This button runs all selected PRM from all categories of policy checks for the current analysis/highway.
- **Run All Checks** - Widget type: button. This button runs all policy checks for the current analysis/highway.
- **Cancel Any Running Checks** - Widget type: button. This button cancels any running policy checks for the current analysis/highway.
- **View Current Analysis Report** - Widget type: button. This button launches the user's preferred report viewer to display the current analysis report.
- **View Analysis Report Index** - Widget type: button. This button item launches the user's specified HTML browser to display an index of analysis reports available for the current analysis.
- **Show Results** - Widget type: button. This button displays a dialog that lists all policy exceptions found during the current session.
- **Run Analysis Summary** - Widget type: button. This button launches the user's preferred HTML browser to display the current analysis report summary.

### 2.3.4.2.2 Cross Section Tab



**Figure 4 Policy Review/Evaluation/Cross Section Tab**

The **Cross Section** tab includes the following widgets: Traveled Way Width, Auxiliary Lane Width, Shoulder Width, Shoulder Type, Normal Cross Slope, Normal Shoulder Slope, Cross Slope Rollover, Normal Ditch Design, Bridge Width, Clear Zone & Roadside Slope, Select/Deselect All Checks, Run Selected Checks, Cancel Any Running Checks, View Current Analysis Report, View Analysis Report Index, Show Results and Run Analysis Summary.

- **Traveled Way Width** - Widget type: check box. This check box selects/deselects the traveled way width policy check. Traveled way width is the portion of the highway for the movement of vehicles, exclusive of shoulders. If this policy check is not supported by the user selected policy, the corresponding check box will be disabled. For additional information, see Through Traveled Way Width in the Policy Review Module (PRM) Engineer's Manual.
- **Auxiliary Lane Width** - Widget type: check box. This check box selects/deselects the auxiliary lane policy check. An auxiliary lane is the portion of the highway adjoining the traveled way for speed change, turning, storage for turning, weaving, truck climbing, and other purposes supplementary to through-traffic movement. If this policy check is not supported by the user selected policy, the corresponding check box will be disabled. For additional information, see Auxiliary Lane Width in the Policy Review Module (PRM) Engineer's Manual.
- **Shoulder Width** - Widget type: check box. This check box selects/deselects the shoulder width policy check. The shoulder is the portion of the highway contiguous with the traveled way that accommodates stopped vehicles, emergency use, and lateral support of subbase, base and surface courses. If this policy check is not supported by the user selected policy, the corresponding check box will be disabled. For additional information, see Shoulder Width in the Policy Review Module (PRM) Engineer's Manual.

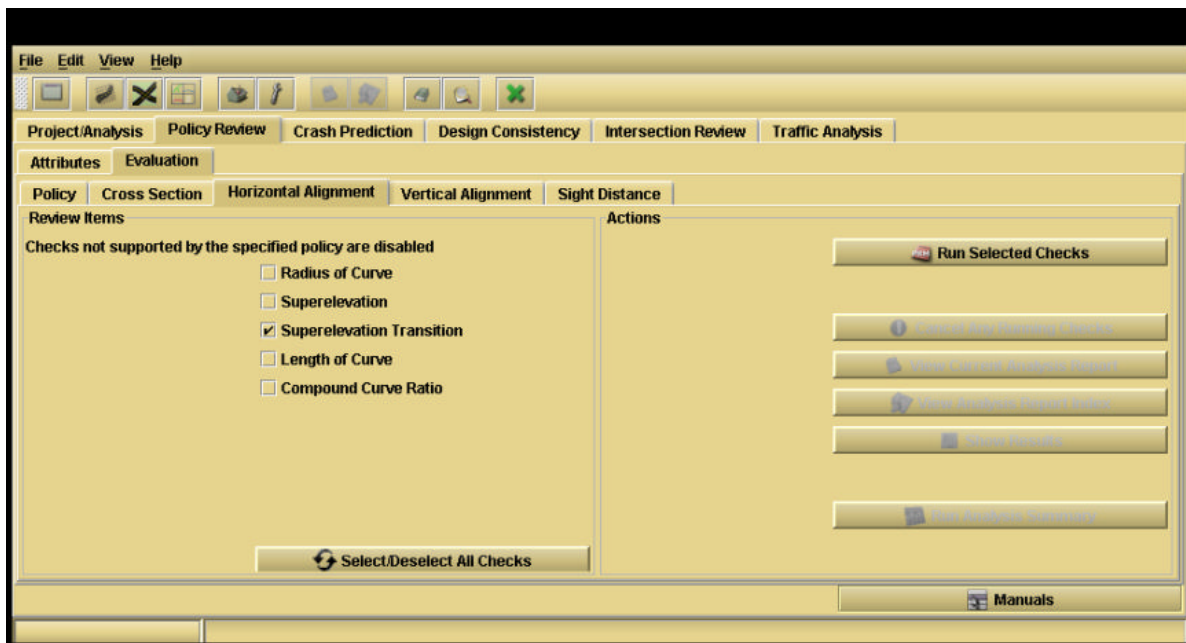
- **Shoulder Type** - Widget type: check box. This check box selects/deselects the shoulder type policy check. AASHTO policy addresses two shoulder conditions - paved or unpaved. If this policy check is not supported by the user selected policy, the corresponding check box will be disabled. For additional information, see Shoulder Type in the Policy Review Module (PRM) Engineer's Manual.
- **Normal Cross Slope** - Widget type: check box. This check box selects/deselects the normal cross slope policy check. The normal cross slope is the lateral slope of the traveled way on tangent alignment. If this policy check is not supported by the user selected policy, the corresponding check box will be disabled. For additional information, see Normal Cross Slope in the Policy Review Module (PRM) Engineer's Manual.
- **Normal Shoulder Slope** - Widget type: check box. This check box selects/deselects the normal shoulder slope policy check. Normal shoulder slope on the roadside is defined as the downward slope of the shoulder away from the traveled way. This PRM check only evaluates normal shoulder slope and does not address cross slope rollover. If this policy check is not supported by the user selected policy, the corresponding check box will be disabled. For additional information, see Normal Shoulder Slope in the Policy Review Module (PRM) Engineer's Manual.
- **Cross Slope Rollover** - Widget type: check box. This check box selects/deselects the cross slope rollover on curves policy check. Cross slope rollover rate on horizontal curves is the algebraic difference in cross slopes of the shoulder and traveled way. If this policy check is not supported by the user selected policy, the corresponding check box will be disabled. For additional information, see Cross Slope Rollover on Curves in the Policy Review Module (PRM) Engineer's Manual.
- **Normal Ditch Design** - Widget type: check box. This check box selects/deselects the normal ditch design policy check. A roadside ditch is an open channel, usually paralleling the highway, to collect and convey stormwater runoff from the highway right-of-way. If this policy check is not supported by the user selected policy, the corresponding check box will be disabled. For additional information, see Normal Ditch Design (not available in the current release of IHSDM) in the Policy Review Module (PRM) Engineer's Manual.
- **Bridge Width** - Widget type: check box. This check box selects/deselects the bridge width policy check. Bridge width is defined as the clear highway width on a structure, including the traveled way and shoulder. Bridge width is measured from face of curb to face of curb, or from base of parapet to base of parapet. Bridge width does not include sidewalk or other pedestrian facilities not available for the use of vehicular traffic. If this policy check is not supported by the user selected policy, the corresponding check box will be disabled. For additional information, see Bridge Width in the Policy Review Module (PRM) Engineer's Manual.
- **Clear Zone & Roadside Slope** - Widget type: check box. This check box selects/deselects the clear zone and roadside slope policy check. Clear zone and roadside slope requirements are directly related and, therefore, evaluated together. Clear zone is described in AASHTO policy as the unobstructed relatively flat area provided beyond the edge of traveled way for the recovery of errant vehicles. The clear zone includes any shoulders and auxiliary lanes. If this policy check is not supported by the user selected policy, the corresponding check box will be disabled. For additional information, see Clear Zone and Roadside Slope (not available in the current release of IHSDM) in the Policy



Review Module (PRM) Engineer's Manual.

- **Select/Deselect All Checks** - Widget type: button. This button selects/deselects all PRM cross section policy check review items.
- **Run Selected Checks** - Widget type: button. This button runs all selected PRM cross section policy checks for the current analysis/highway.
- **Cancel Any Running Checks** - Widget type: button. This button cancels any running policy checks for the current analysis/highway.
- **View Current Analysis Report** - Widget type: button. This button launches the user's preferred report viewer to display the current analysis report.
- **View Analysis Report Index** - Widget type: button. This button item launches the user's specified HTML browser to display an index of analysis reports available for the current analysis.
- **Show Results** - Widget type: button. This button displays a dialog that lists all policy exceptions found during the current session.
- **Run Analysis Summary** - Widget type: button. This button launches the user's preferred HTML browser to display the current analysis report summary.

#### 2.3.4.2.3 Horizontal Alignment Tab



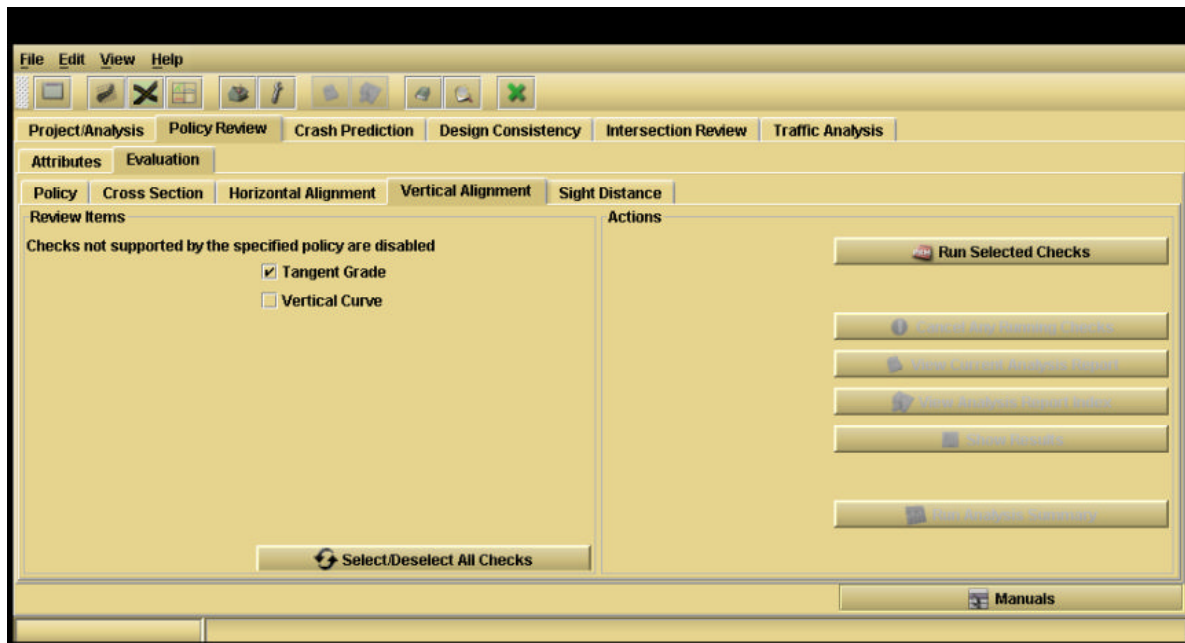
**Figure 5 Policy Review/Evaluation/Horizontal Alignment Tab**

The **Horizontal Alignment** tab includes the following widgets: Radius of Curve, Superelevation, Superelevation Transition, Length of Curve, Compound Curve Ratio, Select/Deselect All Checks, Run Selected Checks, Cancel Any Running Checks, View Current Analysis Report, View Analysis Report Index, Show Results and Run Analysis Summary.

- **Radius of Curve** - Widget type: check box. This check box selects/deselects the radius of curve policy check. If this policy check is not supported by the user selected policy, the corresponding check box will be disabled. For additional information, see Radius of Curve in the Policy Review Module (PRM) Engineer's Manual.

- **Superelevation** - Widget type: check box. This check box selects/deselects the superelevation design policy check. Superelevation rates are determined using the design maximum superelevation rate. This maximum rate would be used for the sharpest curve recommended (shortest radius) for a given design speed. Longer radii curves have lower superelevation rates. If this policy check is not supported by the user selected policy, the corresponding check box will be disabled. For additional information, see Superelevation in the Policy Review Module (PRM) Engineer's Manual.
- **Superelevation Transition** - Widget type: check box. This check box selects/deselects the superelevation transition design policy check. If this policy check is not supported by the user selected policy, the corresponding check box will be disabled. For additional information, see Superelevation Transition (not available in the current release of IHSDM) in the Policy Review Module (PRM) Engineer's Manual.
- **Length of Curve** - Widget type: check box. This check box selects/deselects the length of horizontal curve policy check. If this policy check is not supported by the user selected policy, the corresponding check box will be disabled. For additional information, see Length of Horizontal Curve in the Policy Review Module (PRM) Engineer's Manual.
- **Compound Curve Ratio** - Widget type: check box. This check box selects/deselects the compound curve ratio policy check. If this policy check is not supported by the user-selected policy, the corresponding check box will be disabled. For additional information, see Compound Curve Ratio in the Policy Review Module (PRM) Engineer's Manual.
- **Select/Deselect All Checks** - Widget type: button. This button selects/deselects all PRM horizontal alignment policy check review items.
- **Run Selected Checks** - Widget type: button. This button runs all selected PRM horizontal alignment policy checks for the current analysis/highway.
- **Cancel Any Running Checks** - Widget type: button. This button cancels any running policy checks for the current analysis/highway.
- **View Current Analysis Report** - Widget type: button. This button launches the user's preferred report viewer to display the current analysis report.
- **View Analysis Report Index** - Widget type: button. This button item launches the user's specified HTML browser to display an index of analysis reports available for the current analysis.
- **Show Results** - Widget type: button. This button displays a dialog that lists all policy exceptions found during the current session.
- **Run Analysis Summary** - Widget type: button. This button launches the user's preferred HTML browser to display the current analysis report summary.

#### 2.3.4.2.4 Vertical Alignment Tab



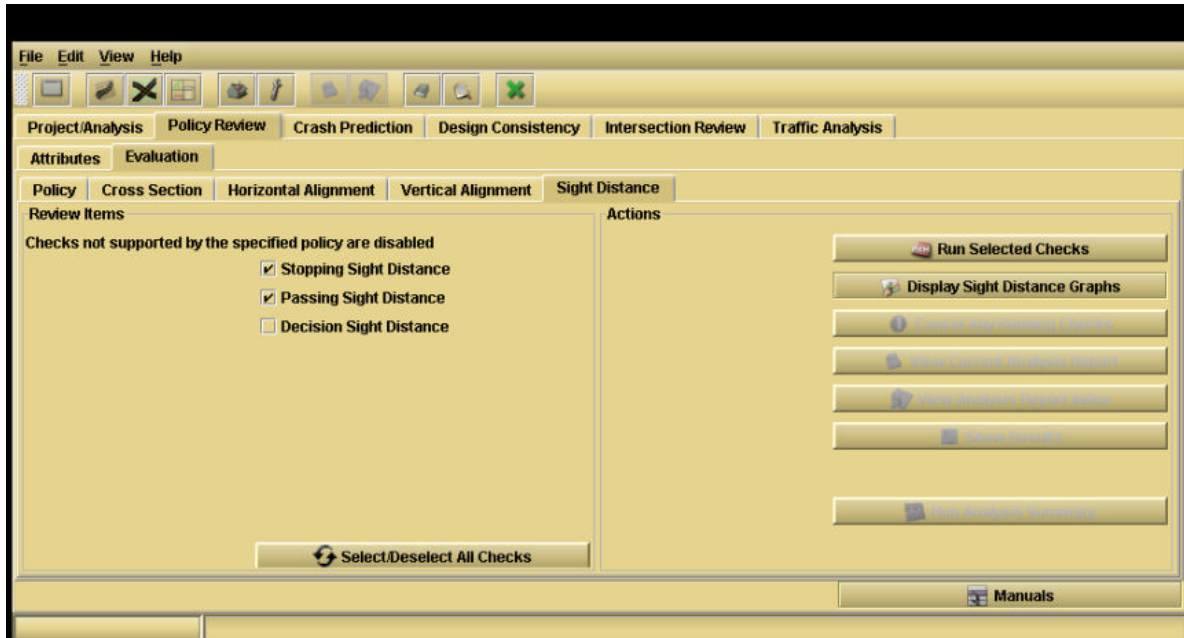
**Figure 6 Policy Review/Evaluation/Vertical Alignment Tab**

The **Vertical Alignment** tab includes the following widgets: Tangent Grade, Vertical Curve, Select/Deselect All Checks, Run Selected Checks, Cancel Any Running Checks, View Current Analysis Report, View Analysis Report Index, Show Results and Run Analysis Summary.

- **Tangent Grade** - Widget type: check box. This check box selects/deselects the tangent grade policy check. Grade is defined as the rise or fall in elevation per unit horizontal distance and is expressed in percent. A tangent that ascends in the direction of increasing stations is positive, a tangent that decreases in the direction of increasing stations is negative. If this policy check is not supported by the user selected policy, the corresponding check box will be disabled. For additional information, see Vertical Tangent Grade in the Policy Review Module (PRM) Engineer's Manual.
- **Vertical Curve** - Widget type: check box. This check box selects/deselects the vertical curve policy check. The PRM evaluates the rate of vertical curvature,  $K$ , for parabolic crest and sag vertical curve.  $K$  is defined as the length of curvature divided by the absolute value of the algebraic difference in entering and existing grade. If this policy check is not supported by the user selected policy, the corresponding check box will be disabled. For additional information, see Vertical Curvature in the Policy Review Module (PRM) Engineer's Manual.
- **Select/Deselect All Checks** - Widget type: button. This button selects/deselects all PRM vertical alignment policy check review items.
- **Run Selected Checks** - Widget type: button. This button runs all selected PRM vertical alignment policy checks for the current analysis/highway.
- **Cancel Any Running Checks** - Widget type: button. This button cancels any running policy checks for the current analysis/highway.
- **View Current Analysis Report** - Widget type: button. This button launches the user's preferred report viewer to display the current analysis report.

- **View Analysis Report Index** - Widget type: button. This button item launches the user's specified HTML browser to display an index of analysis reports available for the current analysis.
- **Show Results** - Widget type: button. This button displays a dialog that lists all policy exceptions found during the current session.
- **Run Analysis Summary** - Widget type: button. This button launches the user's preferred HTML browser to display the current analysis report summary.

#### 2.3.4.2.5 Sight Distance Tab



**Figure 7 Policy Review/Evaluation/Sight Distance Tab**

The **Sight Distance** tab includes the following widgets: Stopping Sight Distance, Passing Sight Distance, Decision Sight Distance, Select/Deselect All Checks, Run Selected Checks, Display Sight Distance Graphs, Cancel Any Running Checks, View Current Analysis Report, View Analysis Report Index, Show Results and Run Analysis Summary.

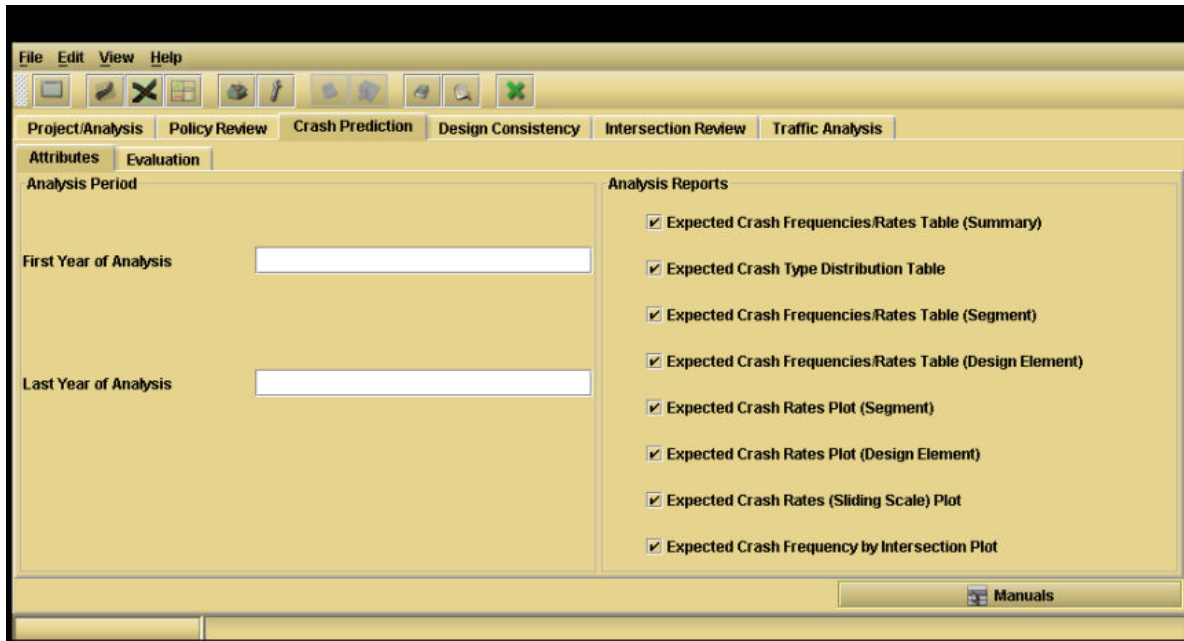
- **Stopping Sight Distance** - Widget type: check box. This check box selects/deselects the stopping sight distance (SSD) policy check. If this policy check is not supported by the user selected policy, the corresponding check box will be disabled. For additional information, see Stopping Sight Distance in the Policy Review Module (PRM) Engineer's Manual.
- **Passing Sight Distance** - Widget type: check box. This check box selects/deselects the passing sight distance (PSD) policy check. If this policy check is not supported by the user selected policy, the corresponding check box will be disabled. For additional information, see Passing Sight Distance in the Policy Review Module (PRM) Engineer's Manual.
- **Decision Sight Distance** - Widget type: check box. This check box selects/deselects the decision sight distance (DSD) policy check. If this policy check is not supported by the user selected policy, the corresponding check box will be disabled. For additional information, see Decision Sight Distance in the Policy Review Module (PRM) Engineer's Manual.
- **Select/Deselect All Checks** - Widget type: button. This button selects/deselects all PRM sight distance policy check review items.

- **Run Selected Checks** - Widget type: button. This button runs all selected PRM sight distance policy checks for the current analysis/highway.
- **Display Sight Distance Graphs** - This menu displays the names of the sight distance graphs that may be displayed. When clicked, this button provides the following menu items:
  - **Display Stopping Sight Distance Graph** - This menu item displays the most recent stopping sight distance graph generated by the policy check. If the stopping sight distance policy check has never been run for this analysis, no graph is available.
  - **Display Passing Sight Distance Graph** - This menu item displays the most recent passing sight distance graph generated by the policy check. If the passing sight distance policy check has never been run for this analysis, no graph is available.
- **Cancel Any Running Checks** - Widget type: button. This button cancels any running policy checks for the current analysis/highway.
- **View Current Analysis Report** - Widget type: button. This button launches the user's preferred report viewer to display the current analysis report.
- **View Analysis Report Index** - Widget type: button. This button item launches the user's specified HTML browser to display an index of analysis reports available for the current analysis.
- **Show Results** - Widget type: button. This button displays a dialog that lists all policy exceptions found during the current session.
- **Run Analysis Summary** - Widget type: button. This button launches the user's preferred HTML browser to display the current analysis report summary.
- **Manuals** - This button displays a menu of relevant manuals for PRM. When clicked, this button provides the following menu items:
  - **PRM Engineer's Manual** - This menu item launches the user's HTML browser to display the PRM Engineer's Manual.
  - **PRM User's Manual** - This menu item launches the user's HTML browser to display the PRM User's Manual.
  - **Help for this tab** - This menu item launches the user's HTML browser to display the section from IHSDM User's Manual for this tab.

### 2.3.5 Crash Prediction Tab

This tab contains the primary graphical user interface to the Crash Prediction Module. The **Crash Prediction** tab includes the following sub-tabs: Attributes and Evaluation. The **Crash Prediction** tab includes the following widgets: Manuals. The Interactive Highway Safety Design Model Frame includes the tabs described in the following sections.

#### 2.3.5.1 Attributes Tab



**Figure 8 Crash Prediction/Attributes Tab**

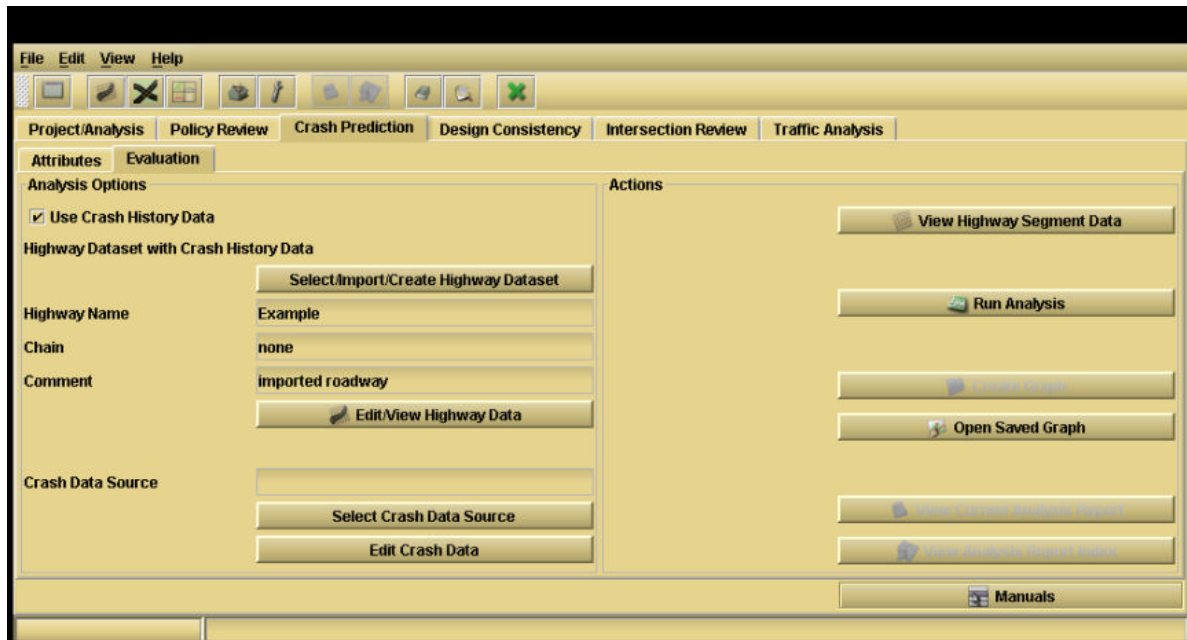
The **Attributes** tab includes the following widgets: First Year of Analysis, Last Year of Analysis, Expected Crash Frequencies/Rates Table (Summary), Expected Crash Type Distribution Table, Expected Crash Frequencies/Rates Table (Segment), Expected Crash Frequencies/Rates Table (Design Element), Expected Crash Rates Plot (Segment), Expected Crash Rates Plot (Design Element), Expected Crash Rates (Sliding Scale) Plot and Expected Crash Frequency by Intersection Plot.

- **First Year of Analysis** - Widget type: text field. Unit of measure: YEAR. This item is the first year of the crash prediction analysis. When a new analysis is created, the value of this item is initialized to next year.
- **Last Year of Analysis** - Widget type: text field. Unit of measure: YEAR. This item is the last year of the crash prediction analysis. When a new analysis is created, the value of this item is initialized using the value of the *First Year of Analysis* and the value of the CPM user default value for *Number of Years*.
- **Expected Crash Frequencies/Rates Table (Summary)** - Widget type: check box. This item will enable/disable the *Expected Crash Frequencies and Rates Summary Table* in the analysis report.
- **Expected Crash Type Distribution Table** - Widget type: check box. This item will enable/disable the *Expected Crash Type Distribution Table* in the analysis report.
- **Expected Crash Frequencies/Rates Table (Segment)** - Widget type: check box. This item will enable/disable the *Expected Crash Frequencies and Rates by Segments Table* in the analysis report.
- **Expected Crash Frequencies/Rates Table (Design Element)** - Widget type: check box. This item will enable/disable the *Expected Crash Frequencies and Rates by Design Element Table* in the analysis report.
- **Expected Crash Rates Plot (Segment)** - Widget type: check box. This item will enable/disable the *Expected Crash Rates by Segment Plot* in the analysis report.



- **Expected Crash Rates Plot (Design Element)** - Widget type: check box. This item will enable/disable the *Expected Crash Rates Plot by Horizontal Design Element* in the analysis report.
- **Expected Crash Rates (Sliding Scale) Plot** - Widget type: check box. This item will enable/disable the *Expected Crash Rates* (with a sliding scale) plot in the analysis report.
- **Expected Crash Frequency by Intersection Plot** - Widget type: check box. This item will enable/disable the *Expected Crash Rates Plot* in the analysis report.

### 2.3.5.2 Evaluation Tab



**Figure 9 Crash Prediction/Evaluation Tab**

The **Evaluation** tab includes the following widgets: Use Crash History Data, Select/Import/Create Highway Dataset, Highway Name, Chain, Comment, Edit/View Highway Data, Crash Data Source, Select Crash Data Source, Edit Crash Data, View Highway Segment Data, Run Analysis, Create Graph, Open Saved Graph, View Current Analysis Report and View Analysis Report Index.

- **Use Crash History Data** - Widget type: check box. This checkbox enables/disables the use crash history data and the Empirical Bayes analysis in the crash prediction. If no crash history data is available, the value of this item is ignored.
- **Select/Import/Create Highway Dataset** - Widget type: button. This button invokes a dialog that provides a way of changing the CPM highway dataset with crash history data. If the **Use Crash History Data** check box is disabled, this button is ignored.
- **Highway Name** - Widget type: text field (read-only). This is the name of the CPM highway dataset with crash history data.
- **Chain** - Widget type: text field (read-only). The value of this item is an optional chain name for the alignment associated with the CPM base highway dataset w/crash data.
- **Comment** - Widget type: text field (read-only). The value of this item is an optional comment for the CPM base highway dataset with crash history data.

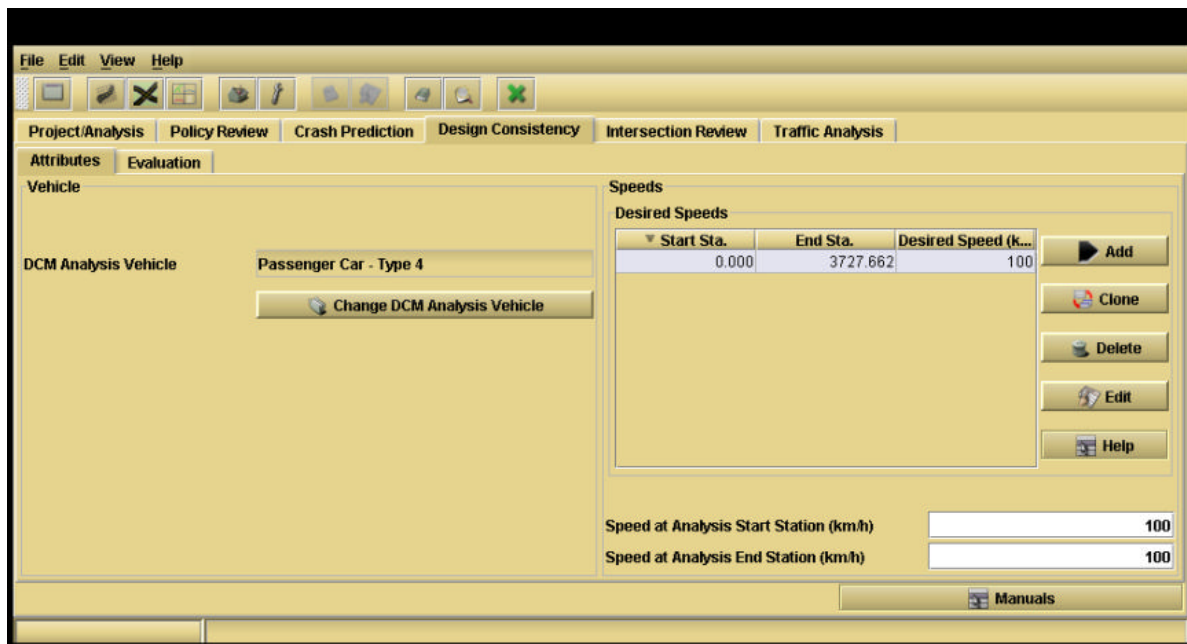
- **Edit/View Highway Data** - Widget type: button. This button starts the edit/view highway data editor for the CPM highway dataset with crash history data. If the **Use Crash History Data** check box is disabled, this button is ignored.
- **Crash Data Source** - Widget type: text field (read-only). This item is the source of the crash history data used in the CPM analysis.
- **Select Crash Data Source** - Widget type: button. This button starts the *Select Crash Data Source* wizard. If the **Use Crash History Data** check box is disabled, this button is ignored. For additional information, see *Selecting Crash History Data in the Crash Prediction Module (CPM) User's Manual*.
- **Edit Crash Data** - Widget type: button. This button starts a dialog to edit the current crash history data. If no crash history data source has yet been selected, the button starts the *Select Crash Data Source* wizard. If the **Use Crash History Data** check box is disabled, this button is ignored. For additional information, see *Editing Crash History Data in the Crash Prediction Module (CPM) User's Manual*.
- **View Highway Segment Data** - Widget type: button. This button starts the HTML browser to display the highway segment data.
- **Run Analysis** - Widget type: button. This button starts the CPM analysis for the specified analysis data.
- **Create Graph** - Widget type: button. This button starts a dialog that allows the user to create and display a graph of the results of the CPM analysis. If the crash prediction analysis has not yet been run, this button is ignored.
- **Open Saved Graph** - Widget type: button. This button invokes a dialog to open and display a previously saved graph.
- **View Current Analysis Report** - Widget type: button. This button launches the user's preferred report viewer to display the current analysis report.
- **View Analysis Report Index** - Widget type: button. This button item launches the user's specified HTML browser to display an index of analysis reports available for the current analysis.
- **Manuals** - This button displays a menu of relevant manuals for CPM. When clicked, this button provides the following menu items:
  - **CPM Engineer's Manual** - This menu item launches the user's HTML browser to display the CPM Engineer's Manual.
  - **CPM User's Manual** - This menu item launches the user's HTML browser to display the CPM User's Manual.
  - **Help for this tab** - This menu item launches the user's HTML browser to display the section from IHSDM User's Manual for this tab.

### 2.3.6 Design Consistency Tab

This tab contains the primary graphical user interface to the Design Consistency Module. The **Design Consistency** tab includes the following sub-tabs: Attributes and Evaluation. The **Design Consistency** tab includes the following widgets: Manuals. The Interactive Highway Safety Design Model Frame includes the tabs described in the following sections.



### 2.3.6.1 Attributes Tab



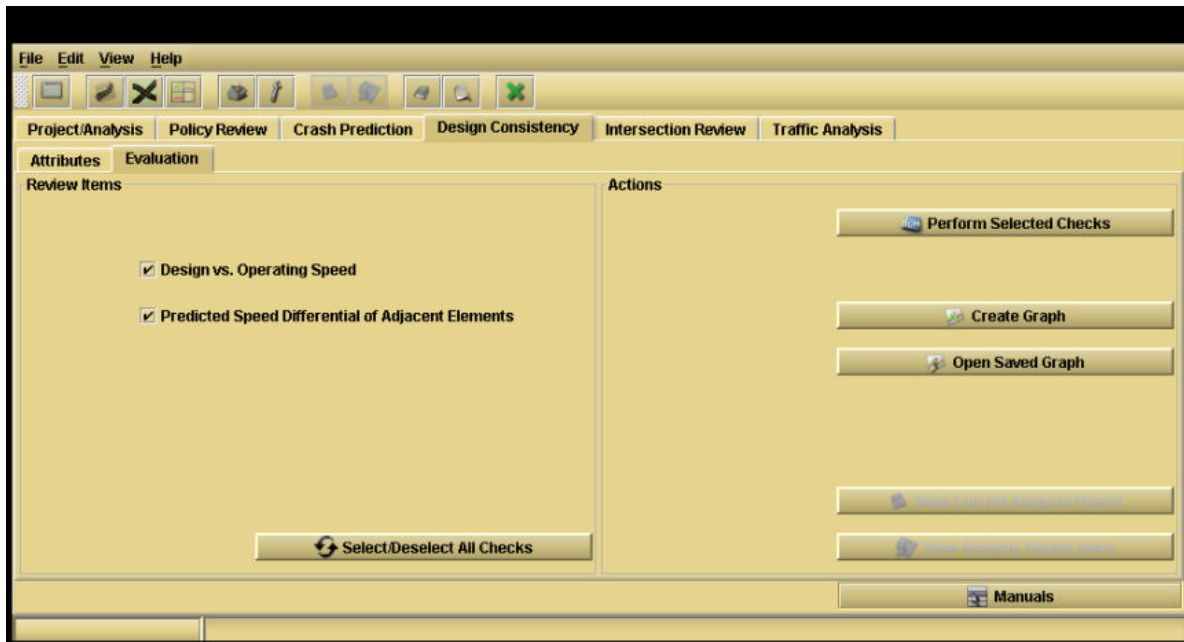
**Figure 10 Design Consistency/Attributes Tab**

The **Attributes** tab includes the following widgets: DCM Analysis Vehicle, Change DCM Analysis Vehicle, Speed at Analysis Start Station, Speed at Analysis End Station and Desired Speed Elements.

- **DCM Analysis Vehicle** - Widget type: text field (read-only). This item is the vehicle type associated with the analysis. The type selected can affect the estimated speed for each element of the alignment.
- **Change DCM Analysis Vehicle** - Widget type: button. This button sets the vehicle type for the active analysis.
- **Speed at Analysis Start Station** - Widget type: text field. Unit of measure: kilometers/hour (miles/hour). This item is the speed used at the start of the analysis. The unit of measure for this item is kilometers/hour (miles/hour).
- **Speed at Analysis End Station** - Widget type: text field. Unit of measure: kilometers/hour (miles/hour). This item is the speed used at the end of the analysis. The unit of measure for this item is kilometers/hour (miles/hour).
- **Desired Speed Elements** List Box - Widget type: list box. Unit of measure: kilometers/hour (miles/hour). This item is the desired speed that drivers select when not constrained by the vertical or horizontal alignment for the span. The **Desired Speed Elements** list box includes the following items: Start Sta., End Sta. and Desired Speed.
  - **Start Sta.** Item - Unit of measure: STATION. The value of this item is the starting station for this highway or design element. This item defaults to the minimum station for the highway.
  - **End Sta.** Item - Unit of measure: STATION. The value of this item is the ending station for this highway or design element. This item defaults to the maximum station for the highway.

- **Desired Speed Item** - Unit of measure: kilometers/hour (miles/hour). This item is the desired speed that drivers select when not constrained by the vertical or horizontal alignment for the segment. The unit of measure for this item is kilometers/hour (miles/hour).

### 2.3.6.2 Evaluation Tab



**Figure 11 Design Consistency/Evaluation Tab**

The **Evaluation** tab includes the following widgets: Design vs. Operating Speed, Predicted Speed Differential of Adjacent Elements, Select/Deselect All Checks, Perform Selected Checks, Create Graph, Open Saved Graph, View Current Analysis Report and View Analysis Report Index.

- **Design vs. Operating Speed** - Widget type: check box. This check box selects/deselects the design speed verses operating speed check.
- **Predicted Speed Differential of Adjacent Elements** - Widget type: check box. This check box selects/deselects the speed differential of adjacent elements check.
- **Select/Deselect All Checks** - Widget type: button. This button will select or deselect all DCM design consistency evaluation items.
- **Perform Selected Checks** - Widget type: button. This button processes the highway element data and generates the results of the design consistency model.
- **Create Graph** - Widget type: button. This button starts the graph dialog that configures the graphical display of the analysis results.
- **Open Saved Graph** - Widget type: button. This button invokes a dialog to open and display a previously saved graph.
- **View Current Analysis Report** - Widget type: button. This button launches the user's preferred report viewer to display the current analysis report.
- **View Analysis Report Index** - Widget type: button. This button item launches the user's specified HTML browser to display an index of analysis reports available for the current

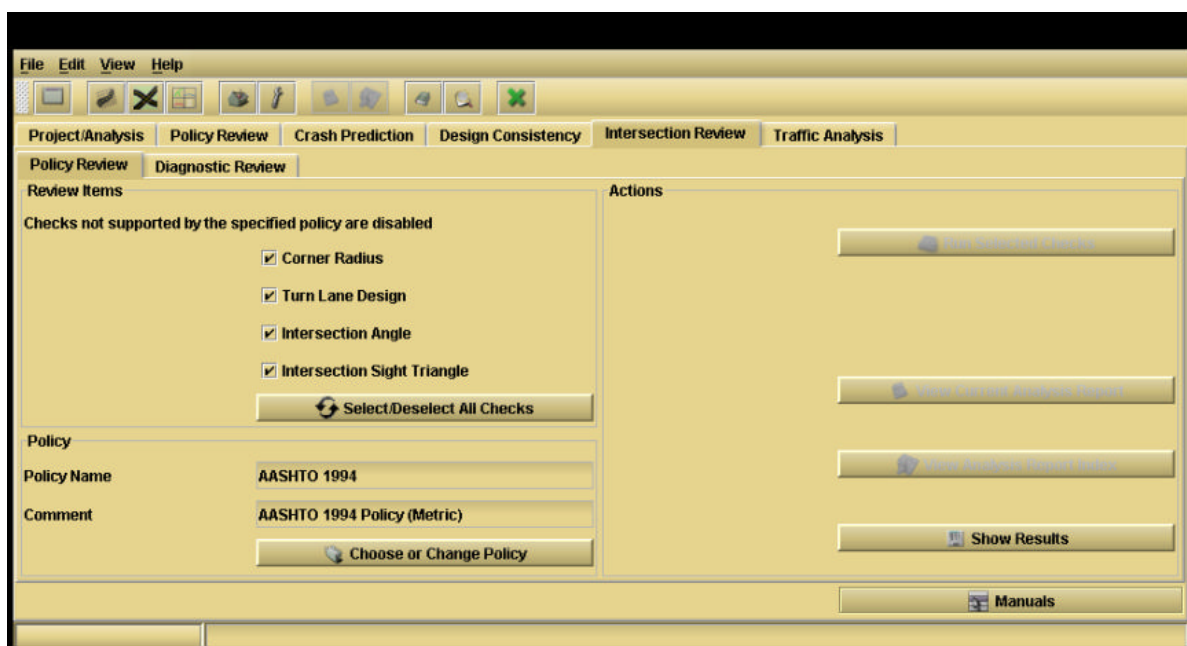
analysis.

- **Manuals** - This button displays a menu of relevant manuals for DCM. When clicked, this button provides the following menu items:
  - **DCM Engineer's Manual** - This menu item launches the user's HTML browser to display the DCM Engineer's Manual.
  - **DCM User's Manual** - This menu item launches the user's HTML browser to display the DCM User's Manual.
  - **Help for this tab** - This menu item launches the user's HTML browser to display the section from IHSDM User's Manual for this tab.

## 2.3.7 Intersection Review Tab

The **Intersection Review** tab includes the following sub-tabs: Policy Review and Diagnostic Review. The **Intersection Review** tab includes the following widgets: Manuals. The Interactive Highway Safety Design Model Frame includes the tabs described in the following sections.

### 2.3.7.1 Policy Review Tab



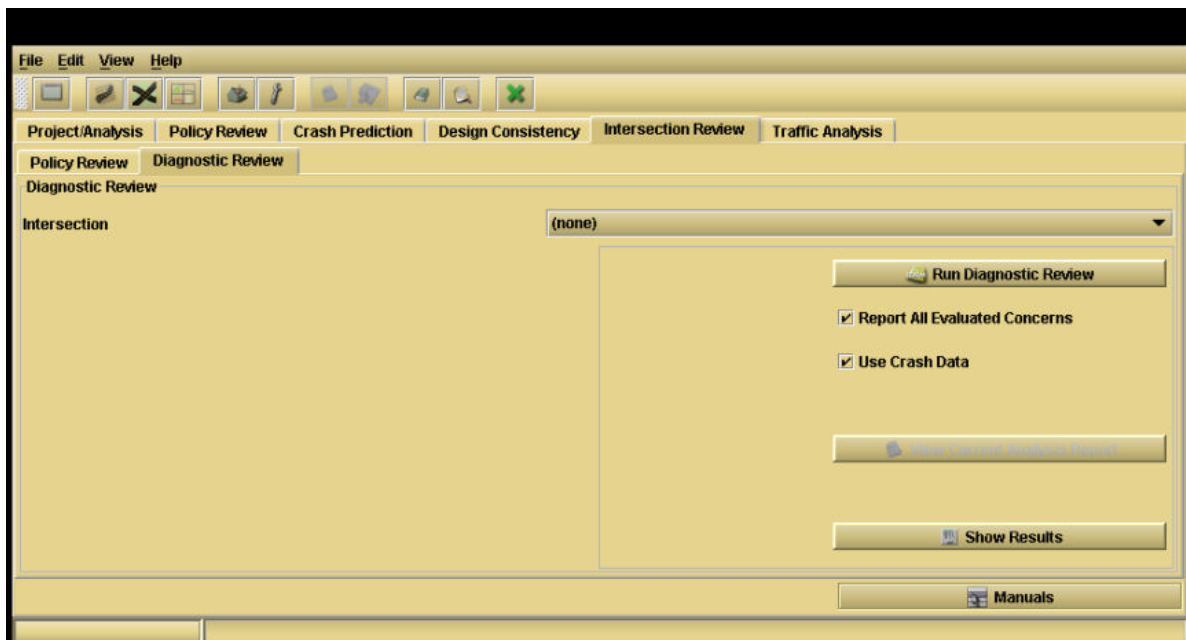
**Figure 12 Intersection Review/Policy Review Tab**

The **Policy Review** tab includes the following widgets: Corner Radius, Turn Lane Design, Intersection Angle, Intersection Sight Triangle, Select/Deselect All Checks, Policy Name, Comment, Choose or Change Policy, Run Selected Checks, View Current Analysis Report, View Analysis Report Index and Show Results.

- **Corner Radius** - Widget type: check box. This check box determines if the corner radius policy should be checked (currently not available).
- **Turn Lane Design** - Widget type: check box. This check box determines if the turn lane policy should be checked (currently not available).
- **Intersection Angle** - Widget type: check box. This check box determines if the intersection angle policy should be checked (currently not available).

- **Intersection Sight Triangle** - Widget type: check box. This check box determines if the sight distance triangle should be checked (currently not available).
- **Select/Deselect All Checks** - Widget type: button. This button selects/deselects all policy review items.
- **Policy Name** - Widget type: text field (read-only). The value of this item is the name of the policy. The policy name is unique within the system.
- **Comment** - Widget type: text field (read-only). The value of this item is an optional descriptive comment about the policy.
- **Choose or Change Policy** - Widget type: button. This button displays a dialog that allows the user to select or modify the current policy.
- **Run Selected Checks** - Widget type: button. This button performs policy review checks on selected items.
- **View Current Analysis Report** - Widget type: button. This button launches the user's preferred report viewer to display the current analysis report.
- **View Analysis Report Index** - Widget type: button. This button item launches the user's specified HTML browser to display an index of analysis reports available for the current analysis.
- **Show Results** - Widget type: button. This button displays exceptions generated in last policy check run.

### 2.3.7.2 Diagnostic Review Tab



**Figure 13 Intersection Review/Diagnostic Review Tab**

The **Diagnostic Review** tab includes the following widgets: Intersection, Run Diagnostic Review, Report All Evaluated Concerns, Use Crash Data, View Current Analysis Report and Show Results.

- **Intersection** - Widget type: combo box. This combo box determines the name of an intersection to be processed. The enumeration values are: **(none)**.

- **Run Diagnostic Review** - Widget type: button. This button performs a diagnostic review on the selected intersection.
- **Report All Evaluated Concerns** - Widget type: check box. The value of this item control whether applicable concerns which are evaluated but found to be invalid are displayed in the analysis report diagnostic review table. If this item is enabled (checked), all evaluated concerns are displayed. If this item is disabled (unchecked), only concerns for which a treatment is recommended are displayed.
- **Use Crash Data** - Widget type: check box. This check box indicates if crash data should be considered when processing concerns.
- **View Current Analysis Report** - Widget type: button. This button launches the user's preferred report viewer to display the current analysis report.
- **Show Results** - Widget type: button. This button displays the exceptions generated in last run.
- **Manuals** - This button displays a menu of relevant manuals for IRM. When clicked, this button provides the following menu items:
  - **IRM Engineer's Manual** - This menu item launches the user's HTML browser to display the IRM Engineer's Manual.
  - **IRM Diagnostic Review Engineer's Sub-manual** - This menu item launches the user's HTML browser to display the IRM Diagnostic Review Engineer's Sub-manual.
  - **IRM User's Manual** - This menu item launches the user's HTML browser to display the IRM User's Manual.
  - **Help for this tab** - This menu item launches the user's HTML browser to display the section from IHSDM User's Manual for this tab.

### 2.3.8 Traffic Analysis Tab

This tab includes the parameters required by the Traffic Analysis Module (TAM). The **Traffic Analysis** tab includes the following sub-tabs: Attributes and Evaluation. The **Traffic Analysis** tab includes the following widgets: Manuals. The Interactive Highway Safety Design Model Frame includes the tabs described in the following sections.

#### 2.3.8.1 Attributes Tab

This tab display the primary control values for the TAM simulation.

**Figure 14 Traffic Analysis/Attributes Tab**

The **Attributes** tab includes the following widgets: Configuration Name, Comment, Change Configuration, Auto Generate Platoon Percent, Flow Rate - Increasing Stations, Flow Rate - Decreasing Stations, Entering Platoon %, Increasing Station, Entering Platoon % - Decreasing Stations, Percent Trucks - Increasing Station, Percent Trucks - Decreasing Station, Percent RVs - Increasing Station, Percent RVs - Decreasing Station, Increasing Stations, Decreasing Stations, Simulation Control, Reduced Speed Zones, Crawl Regions, No Passing Zones, Mean Desired Speed, Passenger Car, Increasing Stations, Desired Speed Standard Deviation, Passenger Car, Increasing Stations, Mean Desired Speed, Truck, Increasing Stations, Desired Speed Standard Deviation, Truck, Increasing Station, Mean Desired Speed, RV, Increasing Stations, Desired Speed Standard Deviation, RV, Increasing Station, Mean Desired Speed, Passenger Car, Decreasing Stations, Desired Speed Standard Deviation, Passenger Car, Decreasing Stations, Mean Desired Speed, Truck, Decreasing Stations, Desired Speed Standard Deviation, Truck, Decreasing Station, Mean Desired Speed, RV, Decreasing Stations and Desired Speed Standard Deviation, RV, Decreasing Station.

- **Configuration Name** - Widget type: text field (read-only). The value of this item is the name of the TAM configuration dataset which includes calibration and accident distribution data.
- **Comment** - Widget type: text field (read-only). The value of this item is a user comment about the TAM configuration dataset.
- **Change Configuration** - Widget type: button. This button displays a dialog that allows the TAM configuration to be selected.
- **Auto Generate Platoon Percent** - Widget type: button. This button generates the value of the platoon percent from the specified flow. The entering platoons percent value is calculated as  $100 * (1 - \exp(-.00176 * \text{Flow}))$ .
- **Flow Rate - Increasing Stations** - Widget type: text field. Unit of measure: vehicles/hour. The value of this item specifies the vehicle flow rate in the direction of

increasing stations. The direction of increasing stations is referred to as direction 1 in the TWOPAS simulation. The unit of measure for this item is vehicles/hour.

- **Flow Rate - Decreasing Stations** - Widget type: text field. Unit of measure: vehicles/hour. The value of this item specifies the vehicle flow rate in the direction of decreasing stations. The direction of decreasing stations is referred to as direction 2 in the TWOPAS simulation. The unit of measure for this item is vehicles/hour.
- **Entering Platoon %, Increasing Station** - Widget type: text field. Unit of measure: percent. The value of this item specifies the percentage of entering traffic following in platoons in the direction of increasing stations. The direction of increasing stations is referred to as direction 1 in the TWOPAS simulation. The unit of measure for this item is percent.
- **Entering Platoon % - Decreasing Stations** - Widget type: text field. Unit of measure: percent. The value of this item specifies the percentage of entering traffic following in platoons in the direction of decreasing stations. The direction of decreasing stations is referred to as direction 2 in the TWOPAS simulation. The unit of measure for this item is percent.
- **Percent Trucks - Increasing Station** - Widget type: text field. Unit of measure: percent. The value of this item specifies the percentage of trucks entering traffic in the direction of increasing stations. The direction of increasing stations is referred to as direction 1 in the TWOPAS simulation. The unit of measure for this item is percent.
- **Percent Trucks - Decreasing Station** - Widget type: text field. Unit of measure: percent. The value of this item specifies the percentage of trucks entering traffic in the direction of decreasing stations. The direction of increasing stations is referred to as direction 1 in the TWOPAS simulation. The unit of measure for this item is percent.
- **Percent RVs - Increasing Station** - Widget type: text field. Unit of measure: percent. The value of this item specifies the percentage of RVs entering traffic in the direction of increasing stations. The direction of increasing stations is referred to as direction 1 in the TWOPAS simulation. The unit of measure for this item is percent.
- **Percent RVs - Decreasing Station** - Widget type: text field. Unit of measure: percent. The value of this item specifies the percentage of RVs entering traffic in the direction of decreasing stations. The direction of increasing stations is referred to as direction 1 in the TWOPAS simulation. The unit of measure for this item is percent.
- **Increasing Stations** - Widget type: combo box. This combo box describes what the upstream alignment consists of beyond the highway limits in the direction of increasing stations. The enumeration values are: **Level Tangent**, **Level Sharp Curves** and **Steep Grade**.
- **Decreasing Stations** - Widget type: combo box. This combo box describes what the upstream alignment consists of beyond the highway limits in the direction of decreasing stations. The enumeration values are: **Level Tangent**, **Level Sharp Curves** and **Steep Grade**.
- **Simulation Control** - Widget type: button. This button displays the simulation control dialog.
- **Reduced Speed Zones** - Widget type: button. This button activates a dialog to edit the reduced speed zones associated with the master highway.

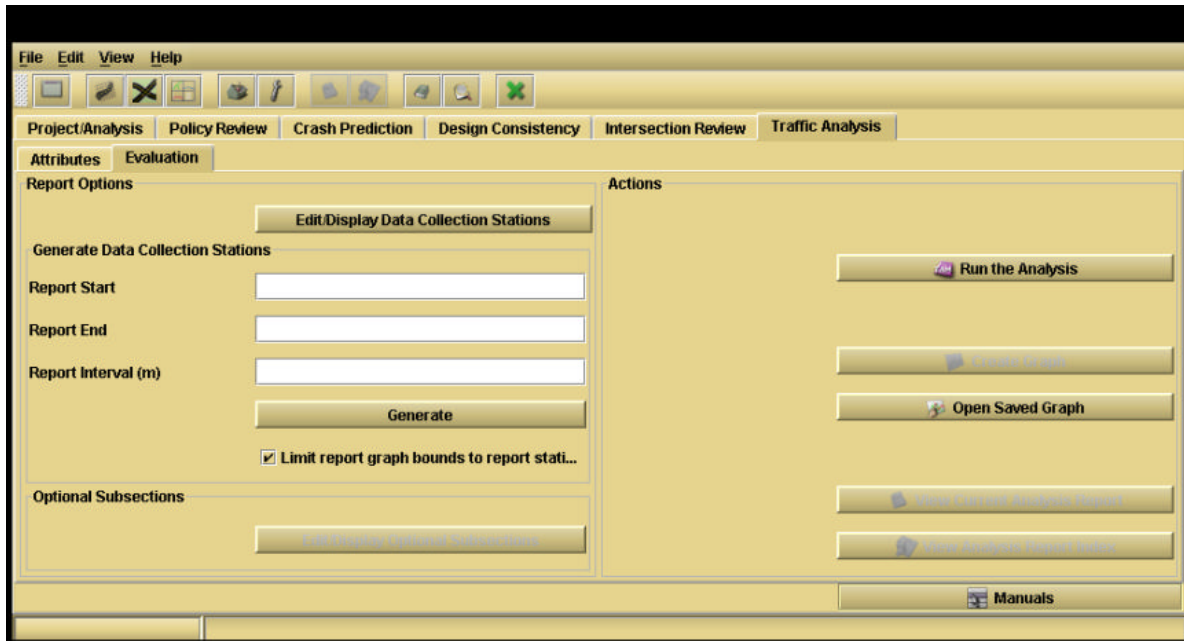


- **Crawl Regions** - Widget type: button. This button activates a dialog to edit the crawl regions associated with the master highway.
- **No Passing Zones** - Widget type: button. This button activates a dialog to edit the no passing zones associated with the master highway.
- **Mean Desired Speed, Passenger Car, Increasing Stations** - Widget type: text field. Unit of measure: kilometers/hour (miles/hour). The value of this item is the mean desired speed of passenger car vehicles in the direction of increasing stations. The default value of the item is the 85th percentile speed at the midpoint of the master highway. If the 85th percentile speed is not defined, the default value of the item is the design speed at the midpoint of the master highway. The unit of measure for this item is kilometers/hour (miles/hour).
- **Desired Speed Standard Deviation, Passenger Car, Increasing Stations** - Widget type: text field. Unit of measure: kilometers/hour (miles/hour). The value of this item is the standard deviation of the desired speed of passenger car vehicles in the direction of increasing stations. The default value of the item is 10% of mean desired speed of passenger car vehicles. The unit of measure for this item is kilometers/hour (miles/hour).
- **Mean Desired Speed, Truck, Increasing Stations** - Widget type: text field. Unit of measure: kilometers/hour (miles/hour). The value of this item is the mean desired speed of truck vehicles in the direction of increasing stations. The default value of the item is 95% of the 85th percentile speed at the midpoint of the master highway. If the 85th percentile speed is not defined, the default value of the item is 95% of the design speed at the midpoint of the master highway. The unit of measure for this item is kilometers/hour (miles/hour).
- **Desired Speed Standard Deviation, Truck, Increasing Station** - Widget type: text field. Unit of measure: kilometers/hour (miles/hour). The value of this item is the standard deviation of the desired speed of truck vehicles in the direction of increasing stations. The default value of the item is 10% of mean desired speed of truck vehicles. The unit of measure for this item is kilometers/hour (miles/hour).
- **Mean Desired Speed, RV, Increasing Stations** - Widget type: text field. Unit of measure: kilometers/hour (miles/hour). The value of this item is the mean desired speed of truck vehicles in the direction of increasing stations. The default value of the item is 95% of the 85th percentile speed at the midpoint of the master highway. If the 85th percentile speed is not defined, the default value of the item is 95% of the design speed at the midpoint of the master highway. The unit of measure for this item is kilometers/hour (miles/hour).
- **Desired Speed Standard Deviation, RV, Increasing Station** - Widget type: text field. Unit of measure: kilometers/hour (miles/hour). The value of this item is the standard deviation of the desired speed of RV vehicles in the direction of increasing stations. The default value of the item is 15% of mean desired speed of RV vehicles. The unit of measure for this item is kilometers/hour (miles/hour).
- **Mean Desired Speed, Passenger Car, Decreasing Stations** - Widget type: text field. Unit of measure: kilometers/hour (miles/hour). The value of this item is the mean desired speed of passenger car vehicles in the direction of decreasing stations. The default value of the item is the 85th percentile speed at the midpoint of the master highway. If the 85th percentile speed is not defined, the default value of the item is the design speed at the midpoint of the master highway. The unit of measure for this item is kilometers/hour (miles/hour).



- **Desired Speed Standard Deviation, Passenger Car, Decreasing Stations** - Widget type: text field. Unit of measure: kilometers/hour (miles/hour). The value of this item is the standard deviation of the desired speed of passenger car vehicles in the direction of decreasing stations. The default value of the item is 10% of mean desired speed of passenger car vehicles. The unit of measure for this item is kilometers/hour (miles/hour).
- **Mean Desired Speed, Truck, Decreasing Stations** - Widget type: text field. Unit of measure: kilometers/hour (miles/hour). The value of this item is the mean desired speed of truck vehicles in the direction of decreasing stations. The default value of the item is 95% of the 85th percentile speed at the midpoint of the master highway. If the 85th percentile speed is not defined, the default value of the item is 95% of the design speed at the midpoint of the master highway. The unit of measure for this item is kilometers/hour (miles/hour).
- **Desired Speed Standard Deviation, Truck, Decreasing Station** - Widget type: text field. Unit of measure: kilometers/hour (miles/hour). The value of this item is the standard deviation of the desired speed of truck vehicles in the direction of decreasing stations. The default value of the item is 10% of mean desired speed of truck vehicles. The unit of measure for this item is kilometers/hour (miles/hour).
- **Mean Desired Speed, RV, Decreasing Stations** - Widget type: text field. Unit of measure: kilometers/hour (miles/hour). The value of this item is the mean desired speed of truck vehicles in the direction of decreasing stations. The default value of the item is 95% of the 85th percentile speed at the midpoint of the master highway. If the 85th percentile speed is not defined, the default value of the item is 95% of the design speed at the midpoint of the master highway. The unit of measure for this item is kilometers/hour (miles/hour).
- **Desired Speed Standard Deviation, RV, Decreasing Station** - Widget type: text field. Unit of measure: kilometers/hour (miles/hour). The value of this item is the standard deviation of the desired speed of RV vehicles in the direction of decreasing stations. The default value of the item is 15% of mean desired speed of RV vehicles. The unit of measure for this item is kilometers/hour (miles/hour).

#### 2.3.8.2 Evaluation Tab



**Figure 15 Traffic Analysis/Evaluation Tab**

The **Evaluation** tab includes the following widgets: Edit/Display Data Collection Stations, Report Start, Report End, Report Interval, Generate, Limit report graph bounds to report stations, Edit/Display Optional Subsections, Run the Analysis, Create Graph, Open Saved Graph, View Current Analysis Report and View Analysis Report Index.

- **Edit/Display Data Collection Stations** - Widget type: button. This button activates a dialog to edit the TAM data collection stations.
- **Report Start** - Widget type: text field. Unit of measure: STATION. The value of this item specifies the starting location (station) of generated data collections stations. The value defaults to the minimum analysis station plus one meter.
- **Report End** - Widget type: text field. Unit of measure: STATION. The value of this item specifies the end location (station) of generated data collections stations. The value defaults to the maximum analysis station minus one meter.
- **Report Interval** - Widget type: text field. Unit of measure: meters (feet). The value of this item specifies the reporting interval of the simulation (recommendation: either match reporting stations or differ from reporting stations by at least 25 m or 80 ft). The unit of measure for this item is meters (feet).
- **Generate** - Widget type: button. This button will generate the data collection station using the specified data report interval.
- **Limit report graph bounds to report stations** - Widget type: check box. This check box indicates if the TAM analysis report graphs will be limited to the min and max report stations.
- **Edit/Display Optional Subsections** - Widget type: button. This button allows the user to enter optional subsections for TAM reporting. Up to nine subsections may be defined, with the total of report intervals plus subsections being no more than 300.
- **Run the Analysis** - Widget type: button. This button starts the TAM analysis for the specified highway and analysis attributes.

- **Create Graph** - Widget type: button. This button starts the graph wizard that configures the graphical display of the analysis results.
- **Open Saved Graph** - Widget type: button. This button invokes a dialog to open and display a previously saved graph.
- **View Current Analysis Report** - Widget type: button. This button launches the user's preferred report viewer to display the current analysis report.
- **View Analysis Report Index** - Widget type: button. This button item launches the user's specified HTML browser to display an index of analysis reports available for the current analysis.
- **Manuals** - This button displays a menu of relevant manuals for TAM. When clicked, this button provides the following menu items:
  - **TAM Engineer's Manual** - This menu item launches the user's HTML browser to display the TAM Engineer's Manual.
  - **TAM User's Manual** - This menu item launches the user's HTML browser to display the TAM User's Manual.
  - **Help for this tab** - This menu item launches the user's HTML browser to display section from IHSDM User's Manual for this tab.

### 2.3.9 Status Bar

The Interactive Highway Safety Design Model Frame includes the statusbar fields listed below.

**Progress Bar** - This progress bar displays the progress of the current processing.

**Progress Bar Text** - This text field bar displays the current processing status message.

## 3. IHSDM Data Organization Concepts

For detailed information on how the data is organized in the IHSDM (users, projects, and analyses) and how external two-lane rural highway data interacts with these data organization levels refer to the IHSDM Data Organization Concepts in the Running IHSDM Software Manual.

## 4. A Typical Session

The purpose of this section is to provide an "engineering" perspective on using the IHSDM software and documentation. This section provides an overview of the IHSDM data organization, outlines the typical steps in using IHSDM, and provides use case scenarios as examples.

### 4.1 Typical Steps in Using IHSDM

When using IHSDM, several different workflows are possible. The intent of this section is not to provide a comprehensive guide (see Running IHSDM Software Manual) for all possible workflows, but rather to illustrate the steps in a typical IHSDM session.

#### 4.1.1 Before Running IHSDM

Before running IHSDM, the user must have a 2-lane rural highway design to be evaluated. Possible sources for the highway data include:

- Electronic design files created using a CAD/civil design package, in a vendor specific (proprietary) format.
- A highway data file(s) in standard LandXML format, either exported from a CAD/civil design package or created "by hand".

- GEOPAK project/design data (\*.GPK and \*.INP files).
- A hard copy set of highway plans containing data that defines the horizontal alignment, vertical alignment, cross-section, etc. for a highway.

Given that the user has a 2-lane rural highway design in some form, the following sections describe typical steps for using IHSDM.

#### 4.1.2 Typical Workflow for Using IHSDM with a New Project

This section outlines a typical workflow for the case where a user creates a new project.

1. Launch the IHSDM (see Launching IHSDM in the IHSDM User's Manual for details).
  - The **Welcome Wizard** opens automatically the first time IHSDM is run by a user. A wizard similar to this one can be launched every time the IHSDM is launch, the user can set this option in the **Edit|User Properties** menu item.
2. Setup the following default User Properties through the **Welcome Wizard** (this wizard will appear the first time a user runs IHSDM). The User Properties can also be changed later through the **Edit|User Properties** menu item.
  - Default project units (metric or English).
  - Default station notations for metric and English projects.
  - Default  $E_{\max}$  used for new analyses.
  - Default directory for importing highway data files.
3. Create an IHSDM project. Input the following:
  - Project name (required and unique to project).
  - Project comment (optional).
  - Project unit system.
  - Station notation.
  - Project directory (optional). If a directory is not input, the program will create one under the user home directory; the project directory name is the same as the project name.
4. Create an analysis associated with the project. Input the following:
  - Analysis name (required).
  - Analysis comment (optional).
  - Analysis  $E_{\max}$ .
  - Analysis year.
5. Create or import a highway dataset.

A highway dataset can be entered into IHSDM directly via the **New** button or imported into IHSDM via the **Import** button on the **Select a Master Highway Wizard Panel**. For importing data, two formats are currently supported: (1) IHSDM standard comma separated value (CSV) format; (2) LandXML 1.0 format.

- If the source highway data are in an electronic file(s) created using a CAD/civil design package, there are several options, depending on whether and to what extent the vendor supports the LandXML 1.0 format for highway data:

- If the CAD/civil design vendor product supports the standard LandXML format for highway data (see LandXML Schema (<http://www.landxml.org>) for a list of vendor products currently supporting the LandXML 1.0 data format), then the highway data can be exported from the vendor's product into LandXML format using the vendor supplied utility/process (which would vary by vendor). This would be performed outside of IHSDM.

The LandXML data file can then be imported directly into IHSDM using IHSDM's LandXML import utility. Any data required by IHSDM that cannot be exported from a vendor product into LandXML format can be entered into IHSDM and edited via the IHSDM edit/view highway data editor. See Editing Highway Elements for details.

- If the CAD/civil design vendor product does not support the standard LandXML format for highway data, the user can enter and edit data used by IHSDM via the IHSDM edit/view highway data editor. See Editing Highway Elements for details.
  - Enter and edit data directly via the IHSDM edit/view highway data editor. See Editing Highway Elements for details. This option is always available, regardless of the highway data source.
- If the source highway data are stored in a LandXML data file(s), the IHSDM's LandXML import utility can be used to import the data directly into IHSDM. Any data required by IHSDM that cannot be exported from a vendor product into LandXML format can be entered and edited via the IHSDM edit/view highway data editor. See Editing Highway Elements for details.
  - If the source highway data are contained in GEOPAK project/design data files, the GEOPAK-to-IHSDM Application Program Interface (API) can be used to extract a subset of geometric data from the GEOPAK GPK and INP files, and convert that data to the standard IHSDM highway data format. The GEOPAK-to-IHSDM Application Program Interface (API) is included with the IHSDM software. See the GEOPAK-TO-IHSDM Application Programmer's Interface (API) User's Manual for details on installing, configuring and using the API. Any data required by IHSDM that cannot be exported from GEOPAK can be entered and edited via the IHSDM edit/view highway data editor. See Editing Highway Elements for details.
  - If the source highway data are contained in a hard copy set of highway plans, the user can enter and edit data used by IHSDM via the IHSDM edit/view highway data editor. See Editing Highway Elements for details.

**NOTE: Each highway dataset in a project must have a unique name. If any highway datasets already exist in the current project with the same names as those in the import dataset, the import operation overwrites the existing highway data. Any modifications made to the existing datasets will be lost.**

6. Select the master highway associated with the analysis from the list of project highway datasets. The user may choose to edit this highway data set at this time or create a new highway dataset by filling out the wizard panels with the required information (see Editing Highway Elements for details). The user can use the edit/view highway data editor to add or modify data and/or to help confirm that data were imported correctly. The highway viewer is also available for viewing the master highway (see Using the Highway Viewer for

details).

7. Run the IHSDM safety Modules. See IHSDM User's Manual and individual Module User's Manuals, and Module Engineer's Manuals for details.

#### 4.1.2.1 Alternative Workflow for Importing a Highway Data File and Associating with an Analysis

An alternative to the above workflow is as follows:

1. Create a project using the **File | Project | New Project** menu item (details are described in the previous section. A project must be opened before editing, importing highway data files, creating or cloning highway datasets.
2. Import a Highway using the **File | Import Highway Data | IHSDM Highway Data** menu item. This launches the **Highway Dataset Import Wizard** (described in detail in the previous section).
3. Create an analysis using the **File | Analysis | New Analysis** menu item (details are described in the previous section).

**Note: make sure to associate a master highway with the analysis before closing the dialog.**

4. Use the edit/view highway data editor via the **Edit | Edit/View Highway Data | Select Master Highway** menu item to add or modify data and/or to help confirm that data were imported correctly (See Editing Highway Elements for details). The highway viewer is also available for viewing the master highway (see Using the Highway Viewer for details).
5. Run the IHSDM safety Modules. See IHSDM User's Manual and individual Module User's Manuals, and Module Engineer's Manuals for details.

#### 4.1.3 Typical Workflow for Using IHSDM with an Existing Project

1. Open a project using the **File | Project | Open Project** menu item and select the desired project. A project must be opened before editing, importing highway data files, creating or cloning highway datasets.
2. Open an existing analysis using the **File | Analysis | Open Analysis** menu item or create a new analysis using the **File | Analysis | New Analysis** menu item (details are described in a previous section).

**Note: make sure to associate a master highway with the analysis before closing the dialog.**

3. Use the edit/view highway data editor via the **Edit | Edit/View Highway Information | Select Master Highway** menu item to add or modify data and/or to help confirm that data were imported correctly (See Editing Highway Elements for details). The highway viewer is also available for viewing the master highway (see Using the Highway Viewer for details).
4. Run the IHSDM safety Modules. See IHSDM User's Manual and individual Module User's Manuals, and Module Engineer's Manuals for details.

## 4.2 Use Case Scenarios

In this section, several use case scenarios are provided to illustrate how IHSDM might be used to address questions regarding the safety of an existing or proposed highway design.

### 4.2.1 Evaluate the Safety of an Existing Highway

IHSDM can be used to address issues such as the following:

- Where do the existing design elements deviate from policy?
- What will be the safety performance of the existing highway in future years, if no improvements are made?

For an existing or proposed design, the Policy Review Module (PRM) and the policy review component of the Intersection Review Module (IRM) can be run to determine which design elements have values outside the range of recommended values according to AASHTO or other policy, and, for controlling criteria, which elements have design values that are not within the controlling criteria.

The Crash Prediction Module (CPM) provides expected predicted crash rates/frequencies for the existing highway in future years, incorporating ADT growth.

### 4.2.2 Evaluate Safety Impacts of Deviations from Policy

First, for an existing or proposed design, the Policy Review Module (PRM) and the policy review component of the Intersection Review Module (IRM) can be run to determine which design elements have values outside the range of recommended values according to AASHTO or other user-selected policy, and, for controlling criteria, which elements have design values that are not within the controlling criteria. The other IHSDM modules can be run to examine the safety implications of those elements identified by the PRM and IRM policy review component as deviating from policy.

### 4.2.3 Evaluate Safety Proposed Design Alternatives

IHSDM can be used to examine and compare the safety of multiple design alternatives. For example, by running the Crash Prediction Module (CPM) for each alternative design, predicted crash rates and frequencies can be compared.

### 4.2.4 Evaluate Safety Impact of a Proposed Improvement/Treatment

IHSDM can be used to evaluate the safety impact (safety cost-effectiveness) of a proposed improvement/treatment (e.g., flattening a sharp horizontal curve, adding or widening shoulders, adding a passing, climbing or turn lane). IHSDM results provide feedback on the benefits (or disbenefits) of the treatment, and might be used to perform cost/benefit analyses outside IHSDM.

If a proposed treatment is for reasons other than improving safety (e.g., to avoid environmentally sensitive areas), IHSDM can be used to evaluate the safety impact.

## 5. IHSDM User Properties

IHSDM properties are used to control the runtime behavior of the system. For detailed information on IHSDM User Properties refer to User Properties in the User Properties and Defaults Manual and User Default Values in the User Properties and Defaults Manual.

## 6. IHSDM Documentation

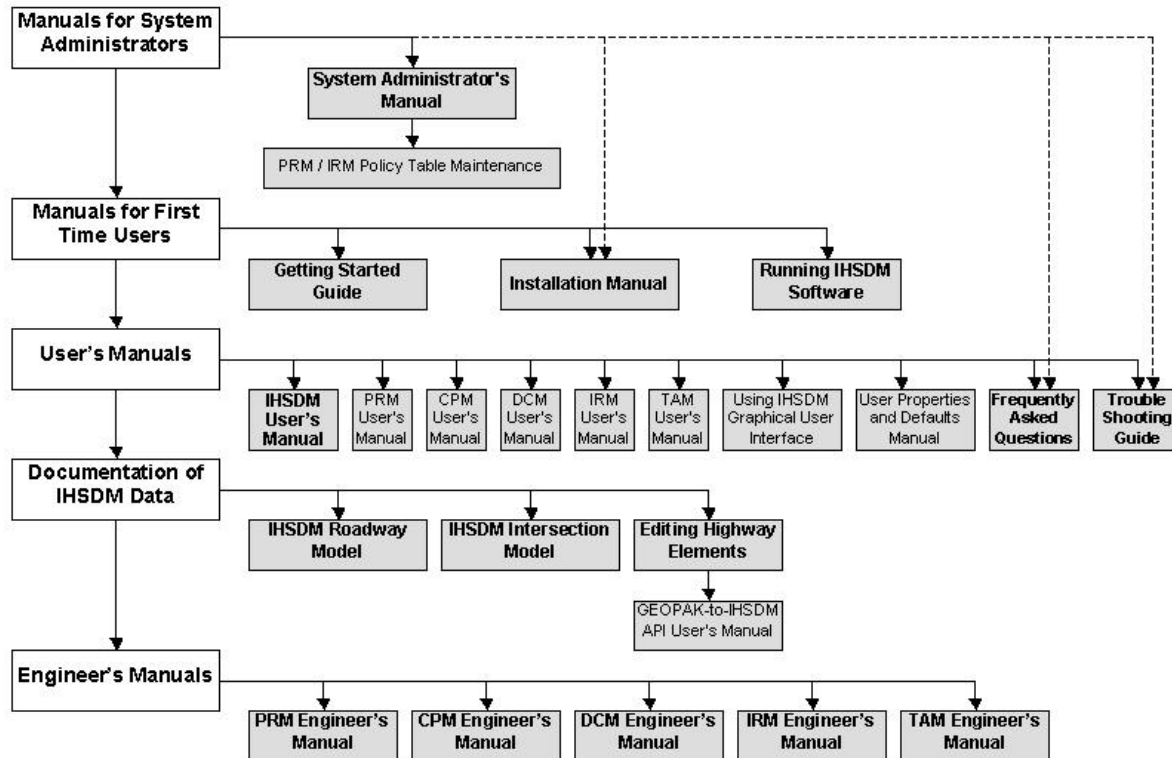
IHSDM documentation is organized in a series of manuals oriented to specific user types and information needs. User types include first-time users, regular users, and system administrators. Information needs include: installing and configuring IHSDM, the mechanics of using the various features of the software, engineering insights to ensure appropriate use of the software and interpretation of outputs, and administering and maintaining the software installation.

The structure of the series of manuals is illustrated in the User Documentation Map. The manuals are listed and described below by the users and information needs they support:

- **Manuals for First-Time Users:** These manuals are oriented to assist new users in installing and configuring IHSDM and running it for the first time. Manuals include:
  - **Getting Started Guide** - An overview of the installation and use of IHSDM. This Guide should be sufficient for stand-alone installations. For client-server installations, the more detailed IHSDM Installation Manual will be needed.
  - **Installation Manual** - A detailed reference to the installation and configuration of IHSDM.
  - **Running IHSDM Software Manual** - An overview of the basic operations in running the IHSDM software. The intent is to provide new users the information they need to run IHSDM for the first time.
- **User's Manuals:** These Manuals are intended as references that regular users can consult when issues arise about the mechanics of using the IHSDM graphical user interface. Manuals include:
  - **IHSDM User's Manual** - A reference for using the primary IHSDM graphical user interface. Other User's Manuals provide additional details on specific components of the IHSDM graphical user interface:
    - **Policy Review Module (PRM) User's Manual** - A reference for using the (stand-alone) Policy Review Module software graphical user interface.
    - **Crash Prediction Module (CPM) User's Manual** - A reference for using the (stand-alone) Crash Prediction Module software graphical user interface.
    - **Design Consistency Module (DCM) User's Manual** - A reference for using the (stand-alone) Design Consistency Module software graphical user interface.
    - **Intersection Review Module (IRM) User's Manual** - A reference for using the (stand-alone) Intersection Review Module software graphical user interface.
    - **Traffic Analysis Module (TAM) User's Manual** - A reference for using the (stand-alone) Traffic Analysis Module software graphical user interface.
    - **Using the IHSDM Graphical User Interface** - A reference for the operation of the individual components of the graphical user interface.
    - **User Properties and Defaults Manual** - A reference for editing IHSDM system properties, user properties, and user default values.
  - **Frequently Asked Questions** - A list of frequently asked questions related to the IHSDM software.
  - **IHSDM Troubleshooting Guide** - A reference for troubleshooting IHSDM software problems.



- Documentation of IHSDM Data: These documents provide detailed descriptions of all IHSDM data elements and references for importing and editing data.
  - IHSDM Highway Model - A reference for the IHSDM highway model, including descriptions of the data elements comprising the model.
  - LandXML Support - A reference for IHSDM support for the LandXML data standard.
  - Editing Highway Elements - A reference for using the Edit/View Highway Elements graphical user interface.
  - GEOPAK-TO-IHSDM Application Programmer's Interface (API) User's Manual - A reference for using the Application Program Interface (API) to export data from GEOPAK into a format that IHSDM can import.
- Engineer's Manual: The intent of these Manuals is to provide the engineering information necessary to make appropriate use of IHSDM evaluation capabilities and interpretation of results. Manuals include:
  - Policy Review Module (PRM) Engineer's Manual - A reference for the engineering issues of using the Policy Review Module.
  - Crash Prediction Module (CPM) Engineer's Manual - A reference for the engineering issues of using the Crash Prediction Module.
  - Design Consistency Module (DCM) Engineer's Manual - A reference for the engineering issues of using the Design Consistency Module.
  - Intersection Review Module (IRM) Engineer's Manual - A reference for the engineering issues of using the Intersection Review Module.
    - **Intersection Policy Review Sub-Manual** - Describes the procedures for checking an intersection design element against relevant policy, including references to the section of the AASHTO policy that contains the information used to develop the module and check the design. **(The Intersection Policy Review Sub-Manual is not available in the current release of IHSDM.)**
    - Intersection Diagnostic Review Engineer's Sub-manual - Describes in detail the concerns that the diagnostic review component considers and the models used to evaluate those concerns.
  - Traffic Analysis Module (TAM) Engineer's Manual - A reference for the engineering issues of using the Traffic Analysis Module.
- Manuals for System Administrators: These Manuals provide system administrators the information they need to maintain IHSDM installations.
  - System Administrator's Manual - A reference for using the IHSDM Administration Tool software graphical user interface. This manual also discusses customizing variable components of IHSDM, including analysis report templates, data dictionaries, and policy files.
  - PRM/IRM Policy Table Maintenance - A reference for editing design policy tables used in the Policy Review Module and Intersection Review Module.



**Figure 16 User Documentation Map**

## 7. Troubleshooting

For updated information on troubleshooting problems in the IHSDM, refer to the IHSDM Troubleshooting guide.

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